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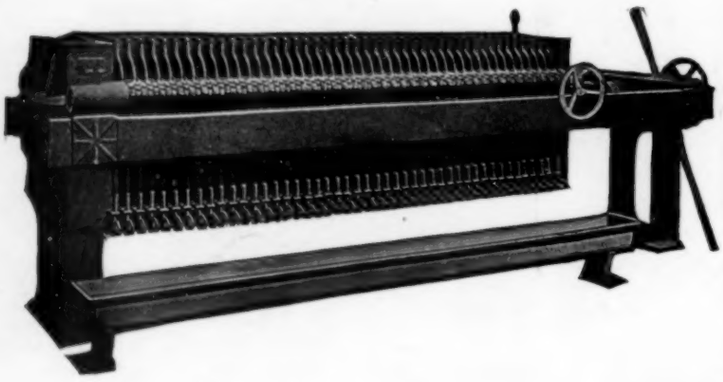

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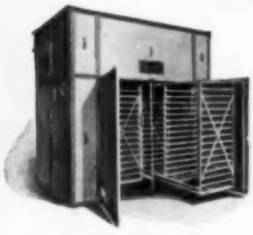

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CHEMICAL & METALLURGICAL ENGINEERING

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Editor

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Franco-German Accord And American Industry

IT WAS an auspicious moment for the world, if slightly embarrassing for Chancellor Marx and Premier Herriot, when those representatives of Germany and France shook hands at the happy conclusion of the London conference. The warm handclasp of international amity and accord has so long been absent in Franco-German diplomatic relations that the whole world must have applauded if it could have witnessed the event. And we believe it does applaud this termination of German evasion and French selfishness, the futility and unhappy consequences of which have been evident for 6 long years. It applauds and finds hope in the will on the part of both contenders to recognize right and justice and to yield to each other in the interest of world-wide peace and prosperity.

With a working basis established and agreed upon, there remains the obviously difficult task of executing its terms and putting them into practical operation. With this phase of the matter the United States generally and our technical industries in particular are deeply concerned. For with Germany rehabilitated industrially, with the Ruhr again under her control, with factories and mills producing to capacity, German goods must inevitably come into this market in competition with our own. If Germany is to pay her debts, she must exploit her resources in raw materials and technical ability. If she is to buy in the markets of the world, she must also sell there.

All this comes home with particular force to our chemical and dye industries. We have now had several years of tariff protection against foreign chemicals and dyes, and a still longer period of virtual protection due to industrial conditions in Europe. Within this time we should have discovered what we can or cannot do, where we can or cannot meet foreign competition. And where we cannot, we must make up our minds that competitive goods will capture the market. Artificial barriers cannot always be maintained against foreign commodities, especially if we demand simultaneously that foreign nations pay their debts to one another and to us. A debtor deprived of his means of livelihood is a poor asset. He can neither buy nor sell.

And after all will it be such a calamity as some would have us believe if German dyes and chemicals again find *some* market in this country? We have established a large industry, but we cannot hope to meet 100 per cent of our needs. A little competition will be stimulating. If American industry is continually to be suckled with the pap of political protection, it will grow weak from sheer lack of a struggle for existence. True, we may have to be watchful lest national welfare be jeopardized, but on the whole we must accept the principle of gaining markets through merit and economic soundness. Much as the United States has contributed to the recent accord through the work of the Dawes committee, it has also placed several economic and political barriers in the way of European progress in the past 6 years. Our rôle for the present is hearty recognition and acceptance of the industrial consequences of the Dawes plan, which we have recommended. We should be poor sports to act otherwise.

Defense Day and The Chemical Industry

IN SPITE of the confusion about the meaning of Defense Day and the misconstruction of its purpose, much of which seems to have been politically inspired, we find it in harmony with the country's thought on national welfare and industrial preparedness after the late war. At that time public and private voices were raised against the delay and inefficiency caused by our lack of co-ordination, and much was said about not being caught again in such a state of chaos. The War Department was reorganized and an Assistant Secretary was charged with making an industrial survey and keeping records that would make it possible on short notice to mobilize industry for the national defense. A part of the plan was to enlist the interest of civilian personnel in reserve corps and otherwise to know where we stood.

Defense Day, therefore, comes not as a belligerent gesture but as a sort of inventory of our resources. It is not designed to disturb the peace of the world, nor will it. It can be construed only as wholesome evidence that the country has not forgotten, at least 6 years after the event, the lessons then sadly learned. The public memory is proverbially short; and if the government now gives evidence of remembrance of our shortcomings in time of need, who shall decry its wisdom? Defense Day is good national housekeeping.

Chemists and the chemical industry have no desire for war, but when war comes they bear a tremendous responsibility. Even more in the future than in the past will the manufacturer of chemicals and the chemical engineer or laboratory worker be required to carry the burden of materiel supply. And it is the appreciation of this possible responsibility that makes the chemist a thorough believer in preparedness.

Fortunately the government is able to maintain in peace time, without expense to itself, practically a complete chemical reserve establishment for manufacture of raw materials. But to convert this potential arsenal of our peace-time industry to a war-time footing is neither easy nor simple. No one realizes this better than the officers of the Chemical Warfare Service who are responsible for the supply of materials and equipment for field service. In harmony with the plans for industrial preparedness they have made careful surveys, noting just where and how it would be possible to add to or slightly modify present industrial estab-

lishments in case chemical warfare materiel was needed on a large scale. This, in fact, furnishes the basis for industrial chemical preparedness.

This year Defense Day falls on Sept. 12, which is within the period of the semi-annual meeting of the American Chemical Society at Ithaca. This at once suggests an unusual opportunity for the chemical profession to demonstrate again its patriotism and its enthusiastic support for any government project which in time of war would require chemical assistance. It will be an exceptional opportunity for chemists to express as a group the enthusiasm that pervades the profession and the industry for that branch of the service to which they are most closely related. No harm will be done by giving a moment's thought to individual as well as industrial responsibilities, while public approval of the Chemical Warfare Service will have a wholesome influence in the War Department as well as among the general public.

The Pulp Industry And Reforestation

WHERE is the pulp and paper industry of the United States to get its raw material 25 years hence? Whose trees are we going to use in the next quarter century to supply our increasing demand for paper products? Are we going to run along complacently, consuming the resources of our own and other countries without regard to a day of reckoning? Or shall we wake up, nationally and industrially, to a policy of reforestation to bolster up our wasting assets? In the thoughtful answers to these questions lies the future welfare of our pulp and paper industry.

The present situation is serious enough to demand concerted action without resorting to exaggeration or distortion of the facts. Figures gathered by the Forest Service and recently made public in a report by Messrs. Clapp and Boyce show that 25 years ago we obtained only 17 per cent of our total supply of pulpwood outside of the country. Today we are importing 51 per cent and the demand is increasing. Extrapolation of the curve of increasing demand over the past 60 years shows that by 1950 our present annual consumption of 7,500,000 tons will be exceeded by 6,000,000 tons. Where is it to come from?

It will be obviously impossible to continue the production of paper products at our present rate unless successful efforts are made to conserve and build up our pulpwood resources. Something can be done by substituting certain pulps for others requiring wood that is more difficult to procure. Ceaseless endeavor can be made to prevent waste by fire, insect pests and decay. New methods can be devised to make our present mills more efficient and less wasteful. But all these economies will not solve the problem of future pulpwood supply without a vigorous effort toward reforestation. It is a bread-and-butter matter for groundwood and sulphite producers in particular, as most of their better woods require from 40 to 50 years for growth to a profitable size. As the report of the Forest Service states, "The alternative of scrapping pulp and paper plants or diverting them to other and less essential products affords no real choice."

We cannot look to Canada indefinitely for a supply of pulp. The royal commission appointed a year ago to survey Canadian forest resources has reported that the forest reserves are being dissipated and that the country should adopt a vigorous policy of forest production as well as forest protection. No recommendation was made on an embargo on pulpwood, though the Canadian Pulp and Paper Association requested such an action. With this example at our very door, the United States should wait no longer before undertaking a systematic scheme of reforestation.

Delivering The Calories

THE great advantages of handling heat by manipulating a liquid in which it is contained are generally appreciated and, for temperatures up to 400 deg. F., the method is widely used. But at higher temperatures, where a heat-carrying liquid is more than ever advantageous, gases and radiation are usually depended upon to move the elusive B.t.u. from place to place. It would seem that a liquid that is stable and inert at, let us say, 1,500 deg. F. could be used to great advantage for handling heat in many of the process industries.

Of course, liquids that can be used for this purpose at high temperatures are few. There are some, however, and these are being put to good use in the transfer of heat by the steel treater. They are salt baths consisting of various mixtures of molten salts so chosen and so combined as to be chemically neutral to the steel or other metal with which they come in contact. They are being tried with promise of success in at least one chemical engineering industry for applying heat in large quantities at predetermined rates and temperatures.

Research is necessary before these heat transfer tools can be readily applied to a given process with certainty of immediate advantage. A means of easily and accurately measuring the viscosity of the liquids at high temperatures must be devised if convection rates and film coefficients are to be determinable. Many quantitative data must be obtained and tabulated. Much research is necessary, we repeat, but it is research that promises a large return.

Modernizing Emergency Devices

THERE has been some talk recently of the advisability of substituting oxy-acetylene metal-cutting equipment for the axe and saw in the usual railroad car emergency kit, on the ground that these tools would be of little use in freeing accident victims from a twisted steel structure. The idea is worthy of indorsement and the suggestion may well be extended to cover emergency kits in the industrial plant. Steel has so completely replaced wood in recent years that when the modern structure is accidentally wrecked metal-cutting equipment is essential for rescue work, but is not always at hand. Safety equipment has not everywhere kept up with progress in structural engineering, nor will it be kept up to date without conscious effort on the part of the plant management. Here is a suggestion that could well be followed up by the safety committee of the plant with a view to providing for the emergency before it exists. That, we believe, is the real function of safety committees. A survey may reveal conditions and possible emergencies unthought of until conscious attention was directed to them.

Easy Money From Borax and Potash

A Criticism of the Promotion Methods of the Burnham Chemical Co. and of the Process by Which It Proposes to Treat the Brine o Searles Lake

An Editorial Statement

WHEN a Main Street grocer in a small town in South Carolina and a suburban pharmacist in Chicago and a clerk in Providence, R. I., and an engineer in Detroit and a teacher in Indiana ask *Chem. & Met.'s* advice about investing in a chemical enterprise of doubtful value, suspicion is aroused that the promoter has at least fortified himself with a large and varied sucker list. And when the alluring, not to say lurid, promotion literature that accompanies these inquiries is examined, suspicion becomes almost a certainty that the alleged investment will prove a disappointment if not a net loss to investors. All of which relates specifically to the Burnham Chemical Co., exploiting a government lease on a part of Searles Lake, California, from which it is proposed to produce borax, potash and other chemicals, but "operating" largely from Reno, Nev., through the medium of the printing press and the United States mails. Our answer to the inquiries mentioned above has been to the effect that we would not advise purchasing stock in the Burnham Chemical Co., because the process has not yet been demonstrated on a large scale and the success of the venture is problematical and highly speculative. Our further opinion has been expressed that projects of this kind should be financed by those who recognize the risks and are willing to take them, and not by small investors who fully expect to get their money back with a large profit.

Elaborate Campaign of Promotion

Neglecting for the moment the process by which the Burnham Chemical Co. expects to recover the salts in Searles Lake brine, we may turn our attention to the advertising and promotion "literature" of this organization, which is unqualifiedly to be condemned as misleading. By cunningly phrased statements the reader is led to believe that financial independence is just over the horizon if he will only overcome his inertia to the extent of subscribing to the shares of the Burnham Chemical Co. By inference and suggestion, potential wealth in the brine of Searles Lake is made to look like money in the bank. If the success of the Burnham chemical processes should by any chance match the shrewdness and ingenuity of the Burnham campaign of advertising, the wealth of the company and the gratitude of its stockholders would be all that they are painted.

Chem. & Met. has been favored with a full line of Burnham promotion circulars since 1922. As a series of appeals to credulity and follow-ups on cupidity they excel any campaign that has come to our notice. Under date of Aug. 22, 1922, we were informed that our opportunity had arrived—provided we made a subscription "within 3 days from the time this offer reaches you." The possibilities of Searles Lake were painted in glowing colors, or rather in "tons of borax, potash and other chemicals." One hundred and thirty-two million tons in all, so that each share of stock in the company represented 13.2 tons of salts, which, at the current wholesale market price, gave a "total estimated potential value of each share of $312." So easily was the mind eased over the wide gap between brine in the lake and borax on the wholesale market that dollar shares for 10c. looked almost like real money. Even if the cost of production were to consume half the "gross revenue," there would still be a net return of $150 on each share, or "a profit return of 150,000 per cent. Gigantic, isn't it!" It was and still is. By a simple hop, skip and jump 10c. becomes $150.

This was only the beginning. Thirty days later we were advised that "up to the hour of writing this letter" our subscription had not been received. Again we were admonished that each 10c. share offered "not only the security of 1,200 lb. of borax but also vast quantities of potash, sodium carbonate, sodium sulphate, sodium chloride and other valuable chemicals." And then the pertinent inquiry, "Were you ever offered such security on any investment in your life?" To which candid reply had to be made in the negative. Then came the prediction that the shares would soon "be worth at least $3." And on Oct. 14, 1922, announcement was made "true to our predictions" that there was to be a 50 per cent price advance at midnight Oct. 25, 1922. Sympathy for the investor, however, and solicitude for his welfare led the Burnham company to send us a fifty-word night letter on Oct. 24, reminding us of the impending rise in price and admonishing us that "every hundred dollar subscription mailed Oct. 25 should be worth with big production $7,000." Financial independence was the bait held out for immediate subscription. Letting this magnificent opportunity slip by, however, we were informed under date of Nov. 10 that "the first issue of Burnham shares at 10c. was oversubscribed 32 per cent." This was calculated to arouse our deep regret; but oversubscription at 10c. did not make it impossible to subscribe at 15c. This was but the first of a series of predicted "advances" that took place from time to time.

The Friendly Secretary

But the crowning touch was yet to come. Under date of Jan. 26, 1923, we received a facsimile handwritten letter from the secretary of the president of the Burnham Chemical Co., the opening paragraph of which follows:

> I just want to drop you a personal line as Mr. Burnham has dictated to me so many letters to you, that I feel acquainted. As Secretary to him, I am in close touch with the affairs of the company. I want to tell you that the directors of the Burnham Chemical Co. have called a meeting to arrange for the advance in price of Burnham shares from 15c. to 20c. each.

Here indeed was a friendly appeal with inside infor-

mation, almost a betrayal of trust. Furthermore, the secretary had just been reading the *Congressional Record* and quoted the opinions of certain Senators on borax, potash, fertilizers, etc., which by delicate inference made the prospects of the Burnham Chemical Co. seem brighter than ever. Incidentally the Burnham shares were bound to go to par soon, "and then way above par." By way of simple proof that "big profits do not jeopardize the safety of investment" a circular cited the success of the Federal Reserve banks and the Ford Motor Co.! Finally under date of Sept. 13, 1923, we received our last invitation to purchase Burnham shares at 25c. This was written hurriedly just before Mr. Burnham left Reno on the night train to supervise construction work at Searles Lake. In order to be impressive Mr. Burnham did not hesitate on this occasion to capitalize on his membership in the Sigma Xi, the American Chemical Society and the American Institute of Electrical Engineers. His diploma in the first and his membership cards in the last two were reproduced in facsimile, as was also his bachelor's diploma from the faculty of the University of California, with an accompanying translation from the Latin.

It may be argued that this is the usual type of stock-selling campaign, but in our judgment it is designed to appeal to the uninformed who are swayed by the mystery of chemical processes and the vision of tremendous natural resources. It is, nevertheless, to be condemned because it is based mainly on hopes and expectations, estimates of cost of production and calculations of income based on current market prices. It is a type of promotion in which the average investor overlooks the question of the technical competence of the promoters, and cannot protect himself against the squandering of his funds in printing, paper and postage. But the Burnham Chemical Co. has gone further in its campaign for funds than the mere use of circular letters. It has embarked on the publication of an eight-page newspaper which it began to print monthly in January, 1924. From its own printed figures the reader is led to infer that from 50,000 to 350,000 copies of this sheet have been distributed monthly. The expense attached to the publication and distribution of 350,000 copies of an eight-page newspaper is no inconsiderable item, and is a wanton waste of funds subscribed by investors for the promotion of a technical enterprise.

Appeals to the Credulous

The whole character and contents of *Desert Treasure*, as the sheet was known in January and February, and *Lake of Treasure*, as it has been known since then, are skillfully misleading. Whether printed and distributed from Reno, Nev., or from Girard, Kan., the successive monthly issues of the paper contain the same material similarly displayed. Stress is laid on the "vast estimated potential wealth behind the company," though how far behind is reserved for discovery by the investor. The articles abound in "ifs" and other speculative expressions. They speak glibly of probable profits. Tons and dollars are bandied about by the million, with due regard only for the careless inference that will be drawn by the casual reader. A page is devoted to "visible proof of ten basic U. S. patents to assure investors." A table shows the present value of $100 or $200 invested in all sorts of enterprises, from the United Cigar Stores to Cream of Wheat, closing with the flamboyant statement that "$100 invested in Burnham Chemical Co. now *may* return to you $48,820." The romantic story of "Borax" Smith, duly illustrated, is published for the encouragement of those who hesitate. Pages 700-701 of vol. 21 of *Mineral Industry* are reproduced as authority for the chemical analysis of the brine of Searles Lake. In short, every artifice and device of the skillful promoter are used in eight pages of newspaper text and illustration to gather subscriptions from a host of investors who ought not to part with their money in such an enterprise. The whole fabric of the promotion is skillfully woven of speculative elements apparently supported by unquestionable authorities, though as a matter of fact the latter have nothing to do with the former. *Mineral Industry's* analysis of the brine and estimate of the contents of the lake have nothing to do with the ability of the company to treat the brine at a profit. Estimated annual dividends and estimated potential wealth behind each share of stock do not insure the technical soundness of the process nor the business success of the enterprise.

Novelty of the Burnham Process

Our knowledge of the technical features and practical operating details of the Burnham process is extremely limited, being confined mainly to statements contained in the promotion literature and patents. We requested a technical article, with results of operation, from Mr. Burnham and received in reply a general statement of the obvious advantages of solar evaporation together with a few results of experiments and a vast amount of estimates on the cost of constructing and operating a large plant for the production of 100,000 tons of potash and borax annually. This was all that could be given, because the company is "not as yet on a production basis." On further request for an outline of the process, giving quantitative data on the expected results from the evaporation of a given quantity of brine of definite composition, we were informed that, while the processes are mostly covered by patents, "there is also much that is secretive" that must be withheld from publication in order to protect the interests of the stockholders. We are fully in sympathy with the idea of protecting the interests of the stockholders; but in the meantime it is necessary to rely on the patent specifications and other literature for details of the process.

The Burnham process depends upon solar evaporation and, if we may judge from the patents, embodies some novel features. It relies upon differences in temperature between day and night, summer and winter, and on the effect of windy weather to bring about the separation and deposition of the salts contained in the brine as it flows or is pumped from one pond to another. With the general proposal to apply solar evaporation in a case of this kind we have no quarrel, but there is little in this instance to indicate that the delicate physical-chemical problem has been solved of recovering in a reasonable degree of purity and on a commercial scale the half dozen salts contained in the brine. It seems unlikely that these salts are going to be sufficiently accommodating, or even trained, to crystallize out separately in designated ponds according to the temperature, the hour of the day or the month of the year. And as for taking advantage of a strong wind in order to separate borax from supersaturated brine, one can picture the chemical engineer of the plant with his hand shading his eyes scanning the horizon like a mariner for a cloud no bigger than a man's hand indi-

cating the approach of a strong wind. Whereupon the flood gates are opened or the pumps started and the brine quickly transferred into another pond, where the agitation set up by wind and waves causes the borax to crystallize. The patents are not wholly consistent, the order of separation of salts in one of them being almost the reverse of that in another.

Over-Invented and Under-Engineered

Truly the Burnham process is still in the experimental stage, and such investigation as we have been able to make warrants the criticism which Mr. Burnham unwittingly admitted when he wrote "that we are endeavoring to make the jump from experimental operation to a commercial scale." Admitting the merits of solar evaporation, the application in this instance seems to be over-invented and under-engineered. A large amount of money has been spent on it, probably with greater effect in the promotion than in the technical development. In 1918-1919 the Solvay Process Co. made an extended test of Mr. Burnham's process at Borosolvay, Calif., with negative results. Six years later the project is still largely in the promotional stage, with profitable production apparently no nearer at hand. In the meantime a vast amount of money has been furnished by substantial interests and small stockholders. Mr. Burnham is persistent and doubtless sincere, but suspicion prevails that he is a better promoter than technologist and that his project is not a desirable investment for people of ordinary means. The company's funds should be diverted from the production of newspapers and promotion literature to research and development along sound technical lines. Until that policy is adopted and reasonable prospects of success assured, investors are well advised to scratch the Burnham Chemical Co. off their list.

Temperature of the Vapor Above Boiling Salt Solutions

An Abstracted Translation of an Article Dealing With Experiments on the Temperature of Evolved Vapors

By K. Schreber

Translated and summarized by W. L. Badger, University of Michigan

FOR many years there has been a discussion regarding the true temperature of the vapors leaving a boiling solution. This has become especially important of late years in connection with the application of thermocompression.

The first statement regarding this phenomenon was by Faraday (*Ann. chim. phys.*, 1822, vol. 20, p. 322), who showed that a solution could be heated to boiling by means of the saturated vapor of the solvent. Gay-Lussac added a note to this article, in which he said that the phenomenon was already known in France. In the introductory words of the article Faraday mentions as a well-known fact that vapor evolved from a boiling solution has the same temperature as that from the pure solvent at the same pressure. It should be noted that this statement of Faraday's and his experiment are not the same. His experiment does not necessarily prove this latter statement.

In 1822, when Fourier published his theory of heat, Gay-Lussac commented on it, saying that this showed that the layer of vapor in equilibrium with the solution must have the temperature of the solution; in other words, the vapors would be superheated. Fourier, however, did not consider in his derivations any heterogeneous systems; and Gay-Lussac did not make any experiments to prove or disprove his points.

Later Wüllner, on the basis of his mechanical theory of the nature of solutions, assumed that the steam formed by boiling a solution was superheated to the temperature of the solution. He carried out no experiments. Most physicists since his time have quoted his statement and perpetuated his ideas. If one takes the more recent text books of physical chemistry, one finds that most of their statements go back to so-called authorities. For instance, one finds the following sentence: "In the instant when it leaves the solution, the steam must naturally possess the elevated temperature of the solution, but the small amount of heat present as superheat in comparison with the latent heat makes it difficult to measure the temperature of the steam after its evolution from the solution." The word "naturally" in the above quotation is the key to the line of reasoning. There was a time when it was considered natural to believe that anyone born under the sign of Jupiter would be lucky. There was time when it was considered natural to try to determine the specific weight of Caloric. Only that is to be considered natural which follows from direct observation of natural phenomena; which is not the case in the sentence quoted above.

The above line of reasoning contains another error; namely, the confusion of the effect of the specific heat of superheated steam with its latent heat of vaporization. The specific heat can only affect this discussion if the temperature-measuring device is subject to thermal losses. There are means by which thermal losses could be avoided in laboratory operations, and the magnitude of the specific heat of superheated steam as compared to its latent heat would then be of no significance.

Chwolson in his textbook of physics (1905, Vol. III, p. 916) says that Magnus has shown that the steam arising from the solution has the same temperature as the solution. Chwolson gives a reference to Magnus' work, but apparently had not read it, for Magnus superheated his thermometer above the boiling point before inserting it into his apparatus, and then says "the thermometer always cools to a few degrees below the temperature of the solution. This observation has no absolute value because by repeating it in the same apparatus and for the same salt solution, different values are obtained." This certainly does not substantiate Chwolson's statement.

Apparently of the many physicists and physical chemists who have made statements about this matter, whether agreeing with Faraday or disagreeing with him, none have carried out systematic experimental work. Faraday's experiment does not prove the case directly.

The author constructed the apparatus shown in Fig. 1. *A* is a metal vessel containing the boiling solution. The cover *B* has a high vapor space *D* surrounded by a

From *Chemische Apparatur*, vol. 10, pp. 169-70, 177-8, 158-8, 193-5 (1923), *Chemical Abstracts*, vol. 18, pp. 558 (1923).

jacket *I*. Through holes *H* in the cover *D* the steam which rises from the solution passes down through the jacket and out through the tube *K*. Consequently, the steam inside the cover *D* is surrounded by a jacket of steam at the same temperature, and this should prevent any cooling of the steam by radiation. In order to make more sure of this point, the whole apparatus was further surrounded by a metal sheath *RM*. The two bunsen burners, *O*, which were used for heating the solution, were placed near circumference of the vessel so that the products of combustion pass up through the annular space between *M* and the main vessel. The result was that it was easy to arrange the heating so that steam in the space between *D* and *I* was actually considerably hotter than the solution. Consequently, in measuring the temperature of steam in the space *D*, radiation was

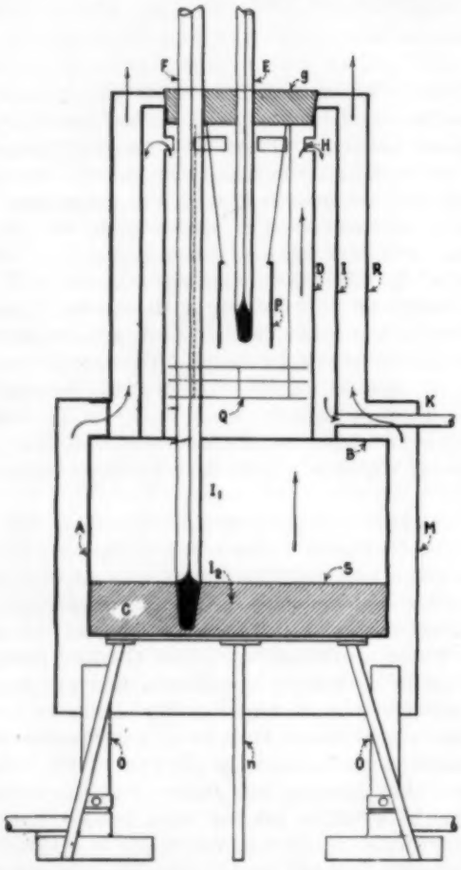


Fig. 1—Sketch of Apparatus Used in the Experiments

inward instead of outward, and therefore there was a tendency to make the temperature inside of *D* too high rather than too low.

This necessitated protecting the thermometer *E* from radiation. A small sheet-brass cylinder *P* was hung from the cork by three thin wires so that it protected the bulb of the thermometer *E* from radiation. This cylinder *P* was very thin and stood out a considerable distance from the bulb of the thermometer; hence it could not have interfered with a free flow of steam over the thermometer bulb.

In this experiment a solution of $CaCl_2$ was used, of such concentration that it boiled at about 108 deg. Under these circumstances the thermometer *P* showed a temperature below 108 deg., but neither exactly 100 deg. nor any other definite temperature.

One of the objections which has been made to such readings as were obtained here is that by the cooling of the thermometer by radiation and conduction, steam condensed on its stem; and naturally, so long as the stem was wet, it could show only a temperature corresponding to saturated steam. In this particular case an inclosed stem thermometer was used with a bulb 16 mm. long and with 185 mm. of the stem inside the vessel. Consequently, the only possible loss by conduction would be that carried through the thin glass shell where it passed through the cork. It is inconceivable that this quantity of heat could actually lower the temperature of the bulb, especially when the whole thermometer was receiving heat by radiation from the hotter jacket. But to make doubly sure of this point, the thermometer was surrounded immediately outside the cork by a glass tube; and the space between the thermometer and this glass tube, from the cork over the top of the thermometer, was filled with paraffine oil, which was heated electrically until it was hotter than the boiling solution. Consequently any leakage along the thermometer must have been inward instead of outward. This would tend to make the results high instead of low, but the thermometer still showed a temperature below the boiling point of the solution. When the screens to prevent entrainment, which are mentioned later, were added, the thermometer showed exactly 100 deg. in every experiment. (The pressure never varied far from 760 mm.).

On examining the apparatus after an experiment, it was found that there would occasionallly be a drop of water on the theromometer. It might be concluded, therefore, that the thermometer was wet due to the fact that it was inserted into the apparatus when cold, and that this wetting prevented it from showing a temperature corresponding to the superheat. It is very difficult to see how, if the steam were superheated and subjected to radiation from the outer jacket and to an influx of heat by conduction along the stem, the stem could stay wet. If water had condensed on the thermometer due to the fact that the thermometer was inserted cold, and if the steam is really superheated, the water formed by initial condensation must have evaporated very rapidly. The fact that this water remained is really more of a proof that the steam was saturated than a proof of a series of errors which vitiated the experiments.

But to make this point quite certain, the thermometer was heated to 200 deg. before it was inserted into the apparatus. After it was inserted, it was read every 15 seconds, but when log (T—100) was plotted against time, it gave a perfectly straight line with no change in slope in the neighborhood of the boiling point of the solution. It showed that the curve was approaching 100 deg. as an asymptote.

There is one rather important precaution that must be taken in such experiments. In spite of the above arrangements, the earlier experiments showed fluctuating temperatures, always below the boiling point of the solution, but never quite down to the temperature corresponding to the pressure. This is due to the fact that it was almost impossible ever to obtain truly dry saturated steam. The boiling solution will also project some particles, which may reach the thermometer.

According to the distance between the thermometer and the solution, the vigor with which the solution is boiled and the shape of the vapor space, the thermom-

eter will be subject to a bombardment of the particles of the solution. If the temperature of the steam were the temperature of the solution, such an arrangement as the one described here should give exactly the temperature of the boiling solution. But if one grants that the steam is saturated, then if the thermometer stem is wet with boiling solution and the thermometer is at the temperature of the steam, there is a tendency for the solution to cool. But the solution can absorb steam as in Faraday's experiment. This will result in raising the temperature of these drops of solution nearer to the boiling point, but will also result in their being diluted by the steam that is condensed to furnish this heat. As they absorb steam and become dilute, they get larger and finally run down the thermometer and drop off. Thus the temperature that is reached by this layer of liquid on the thermometer depends on a balance between the amount of solution spattered onto the thermometer on one hand and the rate at which it absorbs steam, becomes dilute and runs off on the other hand. This is the reason why Magnus, and the present author in his preliminary work, found that the temperature never registered twice alike and was always somewhat lower than the boiling point of the solution.

To eliminate this error, the author inserted three layers of fine wire gauze *Q*, which were hung from the thermometer *F* and did not touch the walls of the vessel. With this final arrangement, the thermometer *E* always showed a temperature exactly corresponding to the pressure no matter what its position or what the rate of boiling might be.

In measurements in commercial apparatus, there is not only the difficulty due to drops of the solution striking the thermometer, but if the apparatus is so arranged that the vapors, after they have been formed, come in contact with heating surfaces, readings that are too high will result. In the present apparatus, it is possible that the walls of the vessel above the level of the solution might be considerably overheated from the products of combustion of the bunsen burners. In spite of this fact, when proper precautions are taken to guard against spray, there was never the slightest evidence of superheating. This may be due to the fact that the walls were always wet with spray, or it may be that the radiation shield around the thermometer bulb cut out a central core of steam which had not been in contact with the walls.

To the translator the above series of experiments seems unusually complete. Every possible factor that would tend to make the readings of the vapor temperature low has been over-corrected, so that the tendency is rather to make the vapor temperature readings high. It would seem as though this series of experiments should, once and for all, dispose of the question as to the temperature of vapors rising from a solution.

No satisfactory reasoning has ever been advanced to explain Faraday's experiment of heating a solution to its boiling point with vapors of the solvent. It cannot be reconciled with the second law of thermodynamics. It certainly seems as though in this case heat were being transferred from a substance at one temperature to another substance at higher temperature. For instance, if a small cloth sack is fastened around the bulb of a thermometer, and this bag filled with some soluble salt, when the thermometer bulb with the bag is held in a stream of pure water vapor, the temperature of the bulb will be considerably above the temperature of the steam. This will be true even when a salt having a negative heat of solution is chosen.

The author's explanation of this is that when steam condenses in the solution, the volume of the solution is increased. There is an osmotic pressure existing in the solution, and this pressure, acting through the increased volume, does work which appears as rise in temperature. Just as a refrigerating effect is obtained by operating a steam engine in the reverse cycle, so the rise in temperature produced when steam is condensed in the solution can be considered as being the reverse of the process that takes place when steam is evolved from a boiling solution with a decrease in temperature.

Imagine two open vessels, one filled with a solution, the other filled with a pure solvent. Suppose these to be inclosed in a space surrounded by a perfect insulator, and suppose that from this space everything has been evacuated except the vapor of the solvent. Then the pressure of the vapor over the solution will be greater than that corresponding to equilibrium, and consequently vapors will be condensed in the solution. This will heat the solution, but according to the ordinary idea the vapor coming off from the solution is at the same temperature as the solution, and therefore not only the solution but the vapor in contact with it will become warmer. Since there is no partition between the vapor over the solution and the vapor over the solvent, the superheated vapor over the solution can communicate its temperature to the vapor over the solvent, and ultimately to the solvent itself. This rise in solvent temperature will cause a rise in pressure of the solvent vapor. This will in turn cause still more solvent vapor to be condensed in the solution with a rise in temperature, and the result will be that the whole system would rise in temperature without any external supply of energy, which is obviously impossible. This line of reasoning does not seem adequate to the translator because in it no cognizance is taken of the fact that when the solvent temperature rises, the increase in solvent vapor pressure can result only from the evaporation of a certain amount of solvent which must consume heat; and the effect of this heat absorption on temperature equilibrium in the vessel has been neglected.

On the other hand, consider this same system in the light of the author's discovery that the vapors of the solution are not superheated. If we begin with the two vessels at the same temperature, then the vapor pressure over the solution is less than the vapor pressure over the solvent. Since the author's experiments prove that the vapor in equilibrium with the solution is saturated, this means that the temperature of the vapors over the solution is less than the temperature of the vapors over the solvent. This means that there will be a flow of vapor toward the solution, that this vapor will condense in the solution, and that the solution will become warmer. The vapor in contact with the solution will likewise be warmer, but since it is saturated, it is cooler than the temperature of the solvent. Consequently, evaporation from the solvent must be at the expense of its own sensible heat and not at the expense of the sensible heat of the vapors in contact with it. The final result is then that the temperature of the solution will tend to increase, while the temperature of the solvent will tend to decrease. This is apparently a contradiction of the second law of thermodynamics, but is not a contradiction of the first law, as would be called for by the older method of looking at this system.

Power and Process Steam From Byproduct Producer Gas

Description of a Highly Efficient Combination System Evolved for Plants Using Steam in the Course of Production

By C. H. S. Tupholme
London, England

GREAT interest is evidenced in Britain and on the Continent in a new system of producing both power and process steam for use in chemical plants, paper mills, soap factories and similar industries. It is claimed by the inventors, Lymn (who controls the American rights), Rambush and the Power Gas Corporation, that the costs of power and process steam generated by this system are considerably less than by the methods generally obtaining. Briefly, the plant consists of three main factors:

A. Gasification of coal by the L.R.P. low-temperature gasification (not carbonization) process, described in *Chem. & Met.* for Feb. 18, 1924, recovering about 80 lb. of ammonium sulphate and 20 to 24 U. S. gallons of tar oils per ton of 2,000 lb. gasified, with a 90 per cent over-all efficiency.

B. Generation of steam at high pressure in special gas-fired boilers guaranteed to give regularly 85 per cent thermal efficiency, and having shown on test up to 90 per cent.

C. Production of power by means of extraction or bleeder turbines delivering the bled steam at low pressure to processing plants as well as a small percentage thereof to the L.R.P. plant for use in gasification.

Table I—Estimated Annual Operating Costs of Low-Temperature Gasification Plant (L.R.P. Process)

Carbonizing capacity	67 tons per 24 hours	
Load:		
Continuous full load 132 hours per week, 50 weeks per year, or 75 per cent capacity.		
Fuel	11,400 B.t.u. per lb. dry fuel	
Nitrogen	1.4 per cent of dry fuel	
Cost	$3 per long ton of 5 per cent moisture	
Steam	Supplied from turbine exhaust	
Labor:		
Common	40c. per hour, 8-hr. shifts	
Charging producer	$5 per day	
Sulphuric acid	60 deg. Bé. at $10 per ton in tanks	
Sulphate of ammonia	$65 per ton f.o.b. works	
Yield	79 lb. per ton of coal gasified	
Tar oils	$20 per ton in bulk, f.o.b. works	
Yield	20 gal. per ton of coal gasified	
Investment:		
L.R.P. plant, erected		$126,500
Buildings and foundation		12,650
Yearly expenses:		
Fuel, 18,000 tons, at $3	$54,000	
Labor	30,000	
Management	3,000	
Repairs and stores	5,200	
Sulphuric acid, 700 tons	7,000	
Depreciation:		
Plant, at 10 per cent	12,650	
Buildings, at 6 per cent	759	
		$112,609
Yearly income:		
Sulphate of ammonia, 711 tons, at $65	$46,215	
Tar oils, 1,500 tons, at $20	30,000	
		76,215
Total annual cost		**$36,394**

Total vol. gas generated (175 B.t.u. per cu.ft.) = 1,890,000,000 cu.ft. per year, at 1.93 cents per thousand = 11 cents per million B.t.u. energy cost.

Item *C* is of course not new in this connection, but *A* and *B* are only lately available. The L.R.P. gasification plant has superseded the old Mond and later Lymn types, many of which have been converted in Britain to the modern system and further installations are under construction, while the Spencer-Bonecourt boilers are established as an efficient steam-generating unit. Each of the three units going to make up the entire process is pretty well known in Britain, but the combination is the novelty.

In the following description of the plant the typical conditions and calculations obtained in Britain have been converted to apply to American conditions, though coal and labor charges may have to be adapted to suit the locality.

I am given to understand that the plant is the outcome of considerable technical research and field trials

Table II—Estimated Cost of Steam Generated in Spencer-Bonecourt-Kirke (S.B.K.) Gas-Fired Boilers by Means of Gas Produced as Per Table I

Steam pressure	300 lb. per sq.in.—675 deg. F. superheat	
Guaranteed efficiency	85 per cent	
Investment:		
Boilers complete, erected		$41,000
Foundations and building		4,000
Operating costs:		
Yearly expenses:		
Labor and supervision		$2,600
Stores, lighting, etc.		1,000
Maintenance and repairs		1,130
Depreciation:		
Boilers, 10 per cent		4,100
Buildings, 6 per cent		240
		$9,070
Cost to get fuel		36,394
Total cost per year		$45,464

Total steam generated yearly.....108,000 tons, approximately
Cost per ton .....$0.45, approximately

It should be noted that the total quantity of steam generated (108,000 tons) does not necessarily represent the steam available for process work. This will vary with the power required and the contingent permissible amount of condensation.

Table III—Estimated Cost of Power Generated by Turbo-Alternators With Steam Cost as Per Table II

Steam consumption of extraction turbine	21 lb. per kw.-hr.	
Investment:		
Turbo-alternators complete, erected		$63,100
Buildings and foundations		13,150
Operating cost of turbo-alternators:		
Yearly expense:		
Labor and supervision		$6,600
Stores and lighting		800
Maintenance and repairs		1,925
Power for auxiliaries		135
Depreciation:		
Machines, 10 per cent		6,310
Buildings, 6 per cent		789
		$16,559
Cost of steam—Table II		45,464
Total cost of power, if there is no extraction		$62,023

Power generated per year.....10,000,000 kw.-hr., approximately
Cost per kw.-hr. .....0.62 cents = $0.0062

in connection with the gasification of bituminous fuel combined with byproduct recovery, and the utilization of the resulting gas in steam boilers for operating turbo-generators.

The steam-raising section of the plant consists of the L.R.P. gasification process and the Spencer-Bonecourt gas-fired multitubular boilers.

The L.R.P. process is essentially a combination of the low-temperature process for the production of tars, oils, ammonia and gas with the producer gas process in the so-called producer-retort in one operation, the over-all thermal efficiency, including the tar and oils, being 90 per cent, while the gasification efficiency is 80 per cent. The resulting gas is a producer gas of 170 to 180 B.t.u. net per cu.ft., combined with a yield of 20 gal. of tar and oils, as well as 80 lb. sulphate of ammonia per ton gasified. The gas yield is approximately 105,000 cu.ft. per ton. All these figures are based on the results of a 3 months trial operated on coal of the following analysis:

	Per Cent		Per Cent
Moisture	5.7	Fixed carbon	56.6
Ash	8.0	Hydrogen	5.0
Volatiles	31.2	Nitrogen	1.47
Total carbon	80.1		

Net calorific value as used 11,500 B.t.u. per lb.

The producer gas from this fuel has the following analysis:

	Per Cent
Carbon monoxide	21 to 22
Hydrogen	20 to 21
Methane	5
Carbon dioxide	8

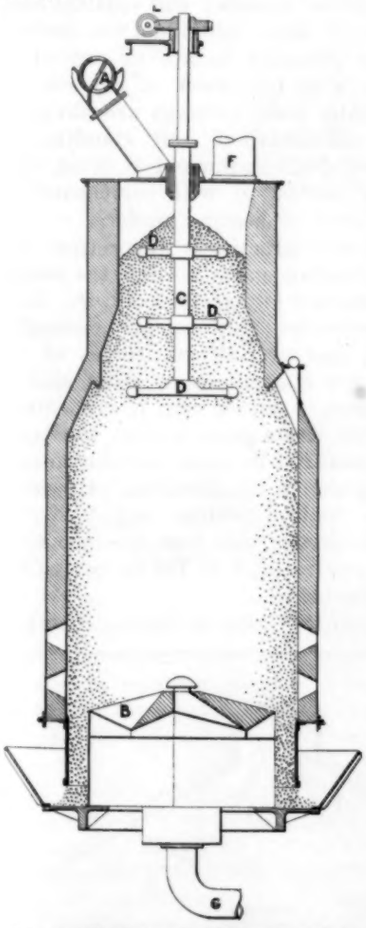


Fig. 1—Producer Used for Complete Gasification of Coking Coals

A—Mechanical fuel feed.
B—Mechanical grate.
C—Water-cooled stirrer shaft.
D—Water-cooled stirrer arms.
E—Stirrer driving gear.
F—Gas outlet.
G—Air inlet.

The plant is simple in operation, while the maintenance and cleaning charges are low, the former being due to the moderate temperature employed and the latter to the absence of soot and dust in the gas. At the same time the plant is of much elasticity as to yield of the respective byproducts and carries periodic overloads without undue effort. The tar yields readily to simple fractionation.

In this plant the evolution of the low-temperature byproducts is effected by even distribution of the hot gases throughout the mass of fuel and the consequent transfer of heat to the fuel in the distillation zone in a gradual manner by the intimate contact of the hot producer gas evolved in the lower part of the producer with the particles of fuel in the upper zone.

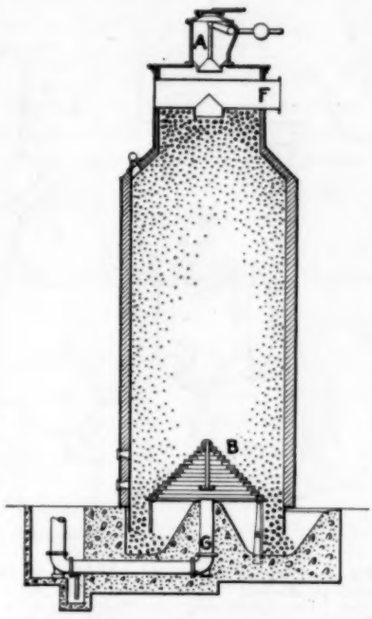


Fig. 2—Producer Used for Complete Gasification of Non-Coking Coals

A—Feed hopper.
B—Static grate.
F—Gas outlet.
G—Air inlet.

The producer retort for use with coking coals is of a completely mechanical type, as shown in Fig. 1, while for non-coking coals a static plant is employed, as shown in Fig. 2. The fuel charged into the producer is maintained in the uppermost or first zone at a low temperature suited to the distillation of the light volatile constituents, while the tar oils and ammonia evolved in the second and third (gasification) zones are passed upward through zones that become gradually cooler and cooler, to avoid cracking of the oils and destruction of the ammonia.

The uppermost zone is that in which coking coals require to be kept in a state of gentle agitation in order to prevent the pieces adhering. To effect this agitation a mechanical stirring apparatus is fitted as shown in the drawing, one stirrer or two being used according to the circumstances of the case. Mechanical grate and ash-removing gear is also shown in Fig. 1. It will, however, be understood that the construction in Fig. 2 applies to those cases where non-coking coals are available, though in that case also the mechanical grate may be included with advantage where labor costs are high.

The boilers for utilizing the rich producer gas generated in the above plant are of the Spencer-Bonecourt-Kirke "S.B.K." type, shown in Fig. 5 and the photograph. These are gas-fired multitubular boilers in

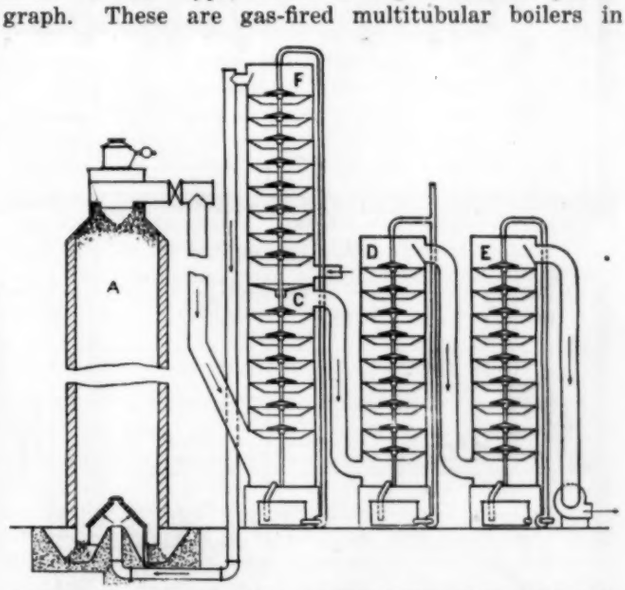


Fig. 3—Diagrammatic Section of Gasification Plant. Blowers, Pump and Ammonium Sulphate Plant Are Not Shown

A—Gas producer. *C*—Dust washer. *D*—Ammonia absorber. *E*—Gas cooler. *F*—Air saturator.

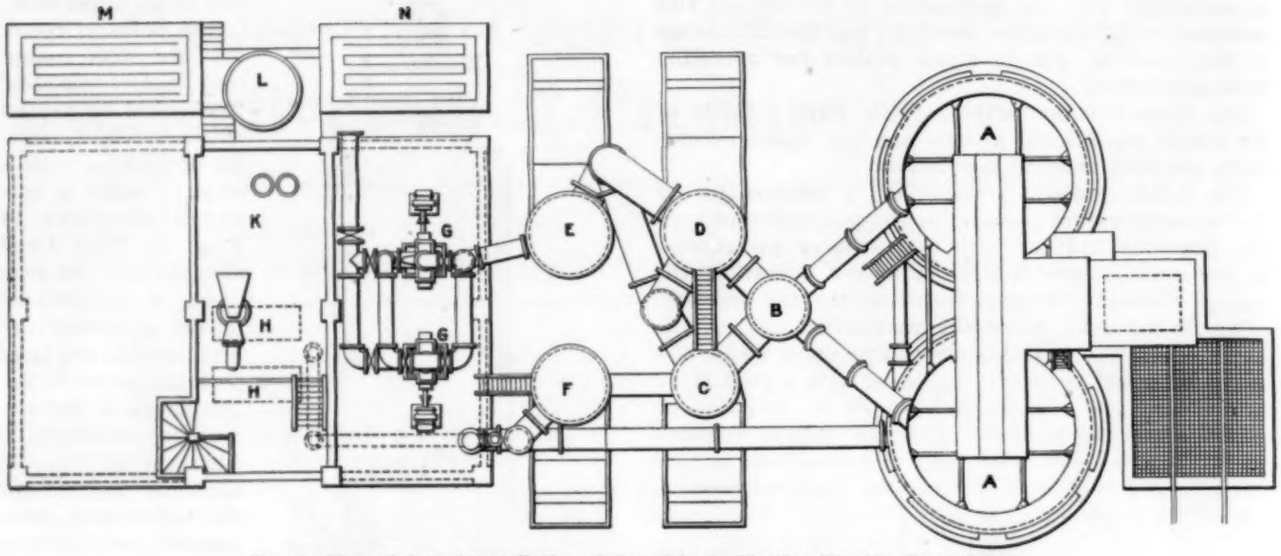


Fig. 4—Plan of Actual Installation of Complete Gasification Plant in Great Britain
A, A—Gas producers. *B*—Junction box. *C*—Dust washer. *D*—Ammonia absorber. *E*—Gas cooler. *F*—Air saturator. *G*—Centrifugal gas cleaners. *H*—Air blowers. *K*—Sulphate evaporating house. *L*—Tar tank. *M*—Dehydrated tar sump. *N*—Tar-collecting sump.

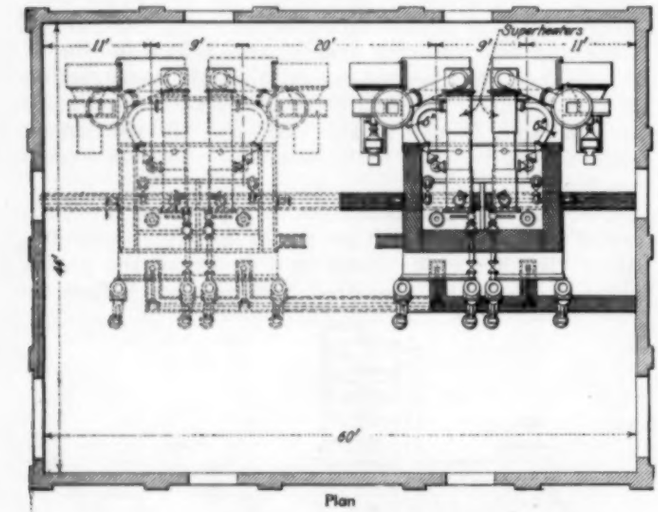
which the gas is burnt in the individual tubes by a multiple-jet burner arrangement. No primary air is used in the burners, hence back-firing at all loads is eliminated and each jet of gas issuing from the burner orifice carries its air for combustion as secondary air into each tube—each tube combining the functions of mixing chamber, combustion chamber and sensible heat absorber. The absence of large individual combustion chambers cuts out the potential hazard of explosion, and furthermore there is no brickwork of any sort in these boilers; consequently leaky settings are obviated and each boiler is a self-contained unit standing in its own cradle. Induced draft equipment is fitted, and high gas velocities are worked to, with corresponding high evaporations per unit of heating surface.

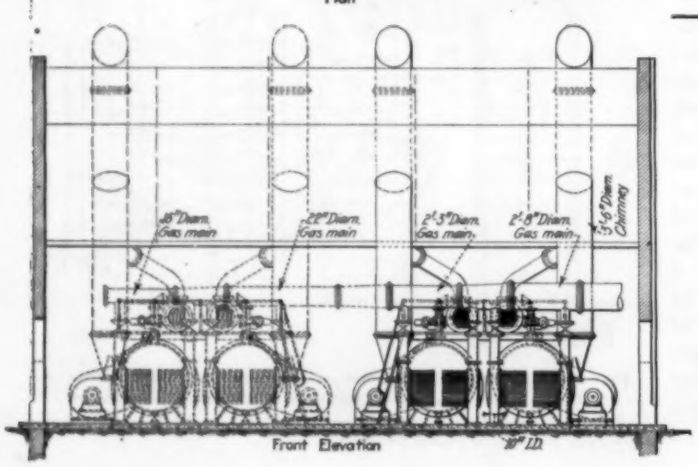
The gas is burned with practically theoretical air volumes, the spent combustion gases leaving the boiler tubes at only a few degrees higher temperature than the steam. The superheater sections are generally similar to the boilers, and over-all efficiencies of 85 per cent gas to steam are guaranteed on these plants, this figure being increased to 90 per cent if preheaters are added to deal with the waste gases leaving the fans, no economizers being required in these circumstances.

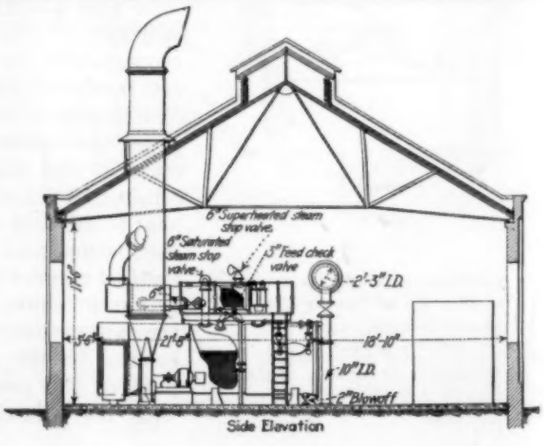
The boiler system is simple in operation, extremely flexible, requires very little attention and is automatically controlled. Boilers of this type are in operation for working pressures as high as 750 lb. per sq.in. and superheats up to 800 deg. F.

The high efficiency of the modern turbo-generator

Fig. 5—Plan and Elevations of Installation of Two Spencer-Bonecourt-Kirke Gas-Fired Boilers With Induced Draft Plant and Superheaters, Arranged to Burn Coke-Oven Surplus Gas







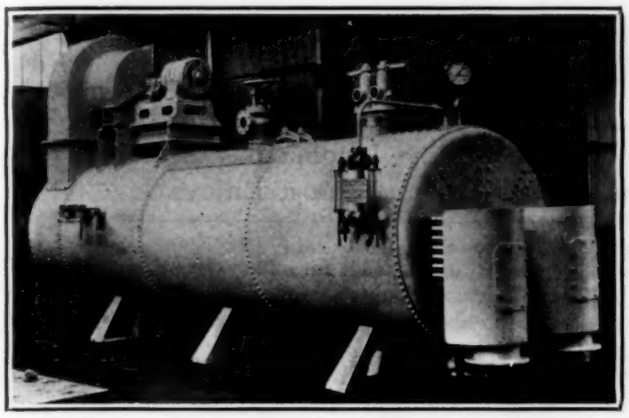


Fig. 6—View of Spencer-Bonecourt-Kirke Gas-Fired Boiler Prior to Installation

working at high pressures and high superheats, whether condensing or exhausting the steam, needs no elaboration here.

The combination described above enables the boilers, being gas-fired and therefore free from coal and ash handling, to be placed absolutely contiguous to the turbines or engines, and both contiguous to the steam-consuming points in the plant, thus avoiding radiation losses.

Appended are figures calculated for American conditions, given by way of example, dealing with operating and other costs of one of these combination plants and assuming a gasification capacity of 60 long tons (67 short tons) of coal per day of 24 hours. Such a plant provides simultaneously power (1,560 kw.) for plant machinery and 15,000 lb. per hour of extraction steam (20 lb. pressure) for processing purposes, the remainder of the steam being condensed. The two products, power and process or extraction steam may be varied in relative quantity according to the requirements of any specific case, and the cost of either commodity depends upon the value attached to the other.

Table IV

	1	2	1*a*	2*a*
Gasification capacity of plant, tons	67	67	134	134
Process steam available at 20 lb. pressure, lb. per hour	15,000	15,000	30,000	53,080
Ditto, tons per annum	49,500	87,500	99,000	175,000
Power available, kw.	1,560	1,060	3,120	2,120
Cost of power per kw.-hr., taking steam at $0.3 per ton, in dollars	$0.00475	$0.0049	$0.00255	$0.00165
Cost of power per kw.-hr., regarding steam as a costless byproduct, dollars	$0.0062	$0.0086	$0.004	$0.0054
Cost of steam per ton, regarding power as a costless byproduct, dollars	$1.29	$0.69	$0.83	$0.432
Steam condensed, tons per annum	58,500	20,500	117,000	41,000
Total steam generated, tons per annum	108,000	108,000	216,000	216,000

It will be seen that under the conditions laid down, with fuel at $3 per ton, there will be generated per annum 10,292,000 kw.-hr. and 49,500 tons of process steam. The operating costs may be expressed alternatively as follows:

a. If the process steam be assumed to have a value of $0.3 per ton, the cost of the power would be $0.00475 per kw.-hr.

b. If the process steam be regarded as a byproduct and no credit taken for it, the cost of the power would be $0.0062 per kw.-hr.

c. If power be regarded as a byproduct and no credit taken for it, the cost of the process steam would be $1.29 per ton.

In column 1 of Table IV, figures representing the above conditions are summarized, while those in column 2 deal with different relative conditions of process steam and power requirements. Columns 1*a* and 2*a* summarize the results of a larger plant operating under similar conditions to 1 and 2.

Removal of Sulphur From Ceramic Wares

Under a general investigation into the oxidation of ceramic wares during firing, being conducted by the Interior Department at the Columbus, Ohio, experiment station of the Bureau of Mines, a study has been undertaken on a semi-commercial scale to test methods that have been developed in a laboratory way for the more rapid removal of sulphur from ceramic wares during firing.

Several shales and fire clays have been chemically and microscopically tested for suitability in the work and a procedure has been worked out for a series of semi-commercial burns. A ton of a North Columbus shale which is particularly difficult to oxidize has been obtained and a number of standard bricks made up. They will be fired in lots of fifty each. Preparations are complete for making the required measurements during the firing and of so controlling and varying the temperature and atmosphere as to get the results desired.

It is planned to fire the kiln in forty-eight hours on a compressed schedule adopted from a commercial kiln recently tested. The first few burns will be for the purpose of developing a technique.

Byproducts As Stock Feeds

The Bureau of Dairying of the U. S. Department of Agriculture has kept in advance of new industries by making feeding tests of numerous byproducts as feed for dairy cows.

Fish meal, which is made from the waste in the canning of sardines by pressing out most of the oil and then drying and grinding the residue, was found to be worth pound for pound 20 or 25 per cent more than prime cottonseed meal, although not so palatable.

Peanut feed, the residue from cold-pressed unhulled peanuts, was found to possess a nutritive value of 74 per cent of that of prime cottonseed meal.

Hydrolized sawdust is unpalatable, contains but little nutriment, and can be fed only in small quantities. The maximum value that apparently can be given to hydrolized sawdust is 14.5 per cent that of corn meal.

Potato silage and corn silage were found to possess about the same feeding value.

Corrosion of Everdur

The tables contained in the Corrosion number of *Chem. & Met.*, July 14, 1924, incorrectly quoted the figures giving quantitative measure of the corrosion resistance of Everdur No. 50, a metal developed by the du Pont Engineering Company.

The penetration in inches per month, at 25%, is as follows: Sulphuric acid 25%, 0.00011; 70% 0.00004. Hydrochoric acid 20%, 0.00023; concentrated, 0.00224. Sea water spray, 0.000028. Mine waters, 0.00052 (velocity 8 ft. per sec.). Chlorine solution (12.5 g. per liter), 0.0016.

Nosaernu Lakimek

Why Is It That the Chemist Occupies a Relatively Ignominious Place in Popular Esteem? Here Is an Answer, an Able One and Most Enjoyable

WHEN Abou Moussah Djabir ben Hajan al Sofi was plying his trade with infant blood, serpent excreta, popular credulity and assorted sundries the profession of Alchemy was a noble and exalted one and deservedly so. Royalty and the élite patronized the search for the philosopher's stone and the elixir of life with munificient abandon. But bond salesmen have usurped and copyrighted the Midas mirage and vaudeville has cabbaged the Rosicrucian hokum. Bereft of these embelishments Alchemy has fallen into sad decay. While Astrology languished and hence remained respectable, Alchemy grew axiomatic and mundane and as its cohorts waxed its popularity inversely waned.

Now comes further enlightenment regarding the fall of the not yet risen American Chemist. With zealous fanaticism the leap is made to clutch the falling standard of our necromancy lest further trailing in the mire should fail to improve its already all too bilious hue.

As Alchemy lost caste its disciples were deprived of their last vestige of dignity. Today the chemist is without the pale—an ass, a scoundrel, or a monomaniac. Nor is the reason of his ill-repute a mystery. Since Alchemy's vacillation from nugacious to aphorismic pretensions its latter day saints have obstinately refused to translate their ritual into terms of common comprehension or interest. Hence the task has fallen to such inspired yokel chicaners as the Sunday supplements and their lurid offspring. These pastmaster bamboozlers, fearing neither God nor man but only truth and the Audit Bureau of Circulations, have found the Alchemist better suited than his etiolated successor to be the subject of their imbecilities. Accordingly it has been an Aladdin-Dr. Faustus hybrid which has been sandwiched between connubial improbity and bobbed-hair banditry and there paraded in hypothetical nude for the amusement and edification of the booboise.

It was very hot in New York and into the sultry summer landscape came this article like a fresh breeze. In its amiable satire there is a shaft of truth and a keen analysis of the chemist's plight. The modest author says it was inspired by an article in the July issue of *The American Mercury*, by L. M. Hussey. We are much indebted both to the source of inspiration and to the author. To those unfamiliar with Sanskrit, the title will perhaps be more intelligible if approached from the rear after the style of Samuel Butler's "Erewhon."

Prevalence of Balderdash

Under the guise of such romantic bathos the chemist has by proxy acquired a reputation as unsavory as it is silly. Thus we learn that Alfred Nobel was a molecule-juggling Dr. Jekyll and Mr. Hyde. As we peer at him through the murky stench of his experimental inferno we perceive hoof, horns and tail; but after a career of this diabolical depredation in the laboratory the hardened old reprobate succumbed to a fatuous softening of the heart, or brain, and founded the peace prizes as a salve to his conscience and immortal prospects much after the fashion of a lifelong Simon Legree endowing a citadel for cats. Or we are informed that the German chemist, through his allegiance with the devil, the black arts and the Vaterland, was, or even still is, able to produce dyes superior to those made by the same procedure in any kettle elsewhere under the sun. Emil Fischer has apparently been overlooked by this seminar of spoof, but likely as not he was given, on occasion, to chastising his wife by immersing her in the first vat of aqua fortis which came to hand.

Through endless repetition this balderdash has come to be generally accepted to an amazing extent. At the precipitation of civilization's latest and greatest war, due to that economic farrago commonly referred to as American enterprise, one nation, the one destined to be our enemy, controlled 90 per cent of the organic chemical industry of the world. Incidentally through the advancement of human ingenuity the winning of a war had come to hinge upon the capacities of the several combatants for the production of about fifty chemical products. For monotonous years the American chemist had been yelping about precisely this emergency. With catwaulerings calculated to electrify a halfwit he had beseeched that the fiftieth part of the cost of a single battleship be spent toward establishing a chemical defense. But the nation which spends how many millions for each of how many battleships and then annually devotes further millions to maintaining it in Arcadian inefficiency could not afford to lavish charity on any character so dubious as the chemist.

Backwash of the Critics

So the chemist was chided for his lack of foresight. Every bathing suit and pair of socks whose rampant colors violated the sanctity of our Nordic fairness, bedizening our persons like so many gaudy Easter eggs, proclaimed his guilt. What a tacky and incompetent fellow he was! Why had he not conducted at his own expense the research necessary to the founding of a coal-tar chemical industry? Although fully aware of his country's need, he had squandered his entire salary of a hundred and fifty dollars a month—which he received even in summer while school was not in session—upon his family. Because of this seditious parsimony we were forced to confiscate the enemy-owned patents which bound round the needed industry. But, crowning shame, even then this alleged chemist was not ready to produce gorgeous and abundant dyes at 10 cents per pound. He had some cock and bull story asserting that the Germans, with perhaps a premonition of what

was to happen, had deliberately obscured the patent specifications so that considerable research was necessary before they could become of service to their emancipators.

Yet the thing was done so quickly that in the pell mell rush of Notes, Liberty Loans, and Four Minute speeches the temporary disability passed almost unnoticed. Industrial, federal and university chemists threw themselves feverishly upon the labor of overnight hatching factories from test tubes. Peacetime found the fledgling industry a battle-scarred veteran and the chemist attempted to turn the versatile talents of his prodigy to the production of drugs and commodities. Chemical hosannas may have been in order, but instead came pious denunciations and the chemist found his country indorsing an international agreement which, if it were ever enforced, would mean the desolation of that industry which had done more than any other to hasten the armistice while incidentally almost establishing our economic and armigerous independence.

Rising from the depths of his professional abstraction the absorbed chemist finds himself in the position of a mediocre politician who has been painted in lurid terms in the memoirs of some garrulous mountebank. Completely disillusioned concerning the truth, he is torn between righteous indignation and the delightfully insidious suspicion that perhaps, after all, he is a rather terrible fellow. What makes this unwarranted conceit so pathetic is that on the one hand it is so obscure while on the other it is so ill suited to withstand the most casual examination. Anyone with the intellectual agility of a breaker boy—any member of the intelligentsia—who is at all informed of the facts is convinced that not even a third rate suburban devil would risk his demoniacal reputation by allegiance with a creature so impotent in matters malefic. Here the chemist enjoys less real respect than a hair net salesman. The blue stockings approach chemistry with an amiable air only to find the chemist trying to demonstrate or interpret his science in a manner which fazes interest and baffles comprehension. They are regaled with childish Thurstonisms involving teapot tempests or cajoled with such phantastic epics as "A Popular Interpretation of Transmutation in the Light of Langmuir's Hypothesis." The demonstration they commend to their four-year-olds but the interpretations they are willing to relegate to no one but the devil. They logically conclude that the chemist is a misanthropist and a bore, to be avoided or endured according to the proprieties and circumstance.

Praise From Those Who Know

Some say this and some say that, but in spite of all calumny the individual chemist as we have known him is not a half bad fellow. True, he probably reads the jokes in the *Journal of the American Medical Association* and, if he served his apprenticeship at Wisconsin or Amherst, may even dandle with socialistic heresy, but on the whole he will average no worse than, say, truck farmers or circus acrobats. And his fetish is not entirely without the semblance of redeeming grace. It tenders balm to both the physical and spiritual welfare. Although it was guilty of furnishing the moving cause of *delirium tremens*, since the stamping out of the last *veteris vestigia flammæ*, it has more than compensated for its early indiscretion by discovering remedies for almost every human ailment save the doldrums. Here if a remedy is wanting pacifiers at least are offered. According to the popular, and so far as known unconfuted, credo the leopard can not change its spots; thanks to chemical ingenuity the modern woman—*que sais-je*—can and does. With cosmetic artistry our flapper dabbles at cupid bow and copper glint sophistry. She can take it or leave it. She manipulates her blushes and her eyebrows, and with cool self-assurance and a perfume pilfered from neolithic blossoms she eclipses the glory that was Cleopatra's. Nothing is lacking, yet all is forever changing; masculine monotony is impossible even in the marital state.

We find that Dr. E. E. Slosson, nationally known editor, has the temerity to proclaim: "The chemist's discoveries and inventions, his economies and creations often transform the conditions of ordinary life, alter the relations of national power and shift the current of thought. The chemist is more than a manipulator of molecules, he is a manager of mankind."

And President Coolidge speaking: "We are enjoying comforts undreamed of a generation ago. These have become possible to a large measure through the knowledge and work of the chemical profession. Wherever we look the work of the chemist has raised the level of civilization and has increased the productive capacity of the nation."

Why the Chemist Fails

But enough praises. If all these pious contentions be true why does our friend the chemist not shine forth as would William Jennings Bryan in a game of strip poker with the Follies chorus. It is because the chemist, fearful lest his esoteric reticence should fail to disfranchise him, goes further and violates every modern precept of decent and seemly behavior. Then he professes to wonder why lawyers, salesmen and physicians wax round bellied and complacent while he grows meager paunched and hectic. He fails entirely to realize that success is not accidental—such popularity must be deserved. By comparing the chemist to the minions of other professions his differences are disclosed, i.e., we discover wherein his weakness lies. In the case of the legal profession only contrast is possible because of the great inherent differences. The chemist seeks to discover and apply laws, the lawyer to create and avoid them. With indigenous acumen the lawyer has spun his profession into a maze of circumlocutions and ambiguities, thus creating a popular need for his services. The chemist, with characteristic stupidity, has allowed his avocation to drift into covert incomprehensibility, thereby obscuring and impeding the value of his work. Is it any wonder that the lawyer is a man among men and, unless unduly punctilious, is sent to the Congress, while the chemist is a puling recluse who, unless parsimoniously frugal, will die either in the atomic saddle or at the county farm?

Perkin Lacked Foresight

For a personal demonstration of chemical hebetude Sir William Perkin, known among chemists as the discoverer of the first coal-tar color, will serve splendidly. As he tested his newly found dye with bits of cloth and found what it was, did a realization of the significance of his accomplishment come to him? Did he rush from the laboratory and incorporate a million dollar company, retaining 51 per cent of the common stock? Did he assemble a staff of super salesmen, ad-writers and publicity men and plaster the island from Orkney to Dover with billboards sloganing all loyal

Britons to give their kiddies a fair chance in life by dressing them in rompers dyed with Perkin's Nofade Mauve? Did he hire Movie Queens or their then equivalent to parade at Brighton in half piece bathing suits dyed with the latest creation of the Perkin Laboratories, Inc. (Offices in all the principal cities of the world)?

Sad to tell, hard to believe and impossible to understand, he did not. How then could he expect to achieve opulence or immortality? Even a brush peddler from Peoria, Illinois, would have recognized the importance of such elementary procedure. It is little wonder that the dye supremacy which his discovery should have won for England shortly passed to Germany; the surprising thing is that the government beneficently adopted his color for the postage stamps.

Now see how it should be done. Every one is more or less familiar with the career of the man who set cash registers to sounding their mellow ding-a-ling-a-ling in every crossroads bar from Hollywood to Philadelphia and so firmly established them that their use survived prohibition while every other appurtenance of the saloon, including the foot rail and the fraternity, have gone by the board. Up to the time of his arrest for violation of the anti-trust laws and subsequent whitewash the Right Honorable John H. Patterson set new standards in spreading the gospel of the cash register. Feeling the stir of the new era, this hardy prophet seized opportunity by the horns and after a few deft touches to bring her up to date he saddled her with the cash register and rode her to fame. His story, as one of pure romance, is deserving of the pen of no less a writer than Horatio Alger, Jr.

The Cash Register Success

Out on the "Campus" stood the Grecian temple in which Go-Getter Patterson assembled his salesmen to instruct them in strong arm methods of handling obstreperous heathen. With regal grandeur he fired these missionaries for failure to pad expense accounts. He booted a vice-president because the fellow sacrilegiously bridged a ditch behind the plant with a structure of modern design instead of one of simple rustic beauty as befitted even the rear entrance of a place so holy. This is the man who shaved, shined and manicured his executives while they pondered in mahogany magnificence on the perpetration of the cash register. Before such a Colossus we stand abashed with Mr. Dooley, who in summing up the achievements of the last century said: "I have seen America spread out from the Atlantic to the Pacific with a branch iv th' Standard Ile Comp'ny in ivry hamlet. I have seen the shackles dropped from the slave so's he could be lynched in Ohio. . . . An' th' invintions . . . th' cotton gin an' th' gin sour an' th' bicycle an' th' flying machine an' th' nickel-in-th'-slot machine an' th' sody fountains an' th' crownin' worruk iv our civilization—th' cash raygister."

Perhaps comparing the chemist to so magnificent a creature is a bit too brutal. One should not attempt to liken a gorgeous street carnival to a poorly painted and inconspicuous country school. Besides it is useless to urge chemical adoption of side-show spieler methods. We would be completely dismayed to find some bewhiskered savant of our craft attempting to learn sky writing, or competing for the honors of Al Jolson, or writing testimonials for beauty clay, or dancing in the altogether along Riverside Drive, or challenging the fistic ability of the Very Reverend Dr. Jack Dempsey, or devoting his time to reading character at sight, or taking exercises to develop personal magnetism, or competing with any of the Messieurs Valentino, Weismuller or Wright in their respective lines or even running for the Congress.

Model After the Physician

To whom then shall we turn for a guide to chemical conduct? To attempt comparison to the building trades is too far fetched and would probably incur a suit for damages from those worthy gentlemen. It is to the medics that the chemist must repair in his dilemma. Only yesterday the blood letter apprenticed in an abbatoir and the alchemist in a muck heap. The ascension of both professions to utility has been parallel as to both time and capacity. Yet the chemist is a disgruntled failure, while the physician is the most respected man in the community. Mud may be thrown at the mayor, the councilmen or even the judges, but whoever depreciates the least platitude of the local steward of the spiritus frumenti is at once and perhaps justifiably suspected of being a chiropractor, a disgruntled quack or a plain calamity howler.

For the past decade our neoteric industrial physician—the chemical engineer—has been attempting to plagiarize the ethics of the medical profession. He expected and has encountered no end of difficulty due to the technical idiocy of sales graduated executives. But the thorn in the side of our carpet bagger in the realm of finance has been the antagonism from the patrician members of the brotherhood. At the first hint that some obsolete canon of our catechism is in peril, the learned Doctors Hanky and Panky, the flower of the anointed, rise with shrill horror and denunciation, "We must keep the science pure." Yet looking for purity in the entire length and breadth of chemistry is like seeking virtue in a heifer or serious dramatic art in a motion picture. In reviewing the process of chemical degeneration one is almost tempted to suspect that, having too great a sense of humor for his own good, the chemist has been so altogether unusual as to fail to apply it to himself. If so it is a grievous fault.

After so long it seems a safe conclusion that the mountain is not coming to us; that we must, if we wish to possess it, travel to it. It is all very well to argue that the economic system which rewards prize fighters, ad-writers, pie throwers and bricklayers out of all proportion to chemists is at fault. The mountain is as remote as ever. The next suspicion which comes buzzing for recognition is that perhaps it would be easier to shape our actions to fit the present code than it would be single handed to reform the world. If interested we are readily convinced that the medical profession suffered no loss of dignity through their adaptation to environment. These men cheerfully devote space in their journals, time at their meetings and energy of their personnel to the problem of social relations. Good natured humor, caustic irony or outright denunciation are tools which they wield with equal facility. And nine of the ten chemists who squawk the loudest when one of our own journals devotes a column to public relations at the expense of plant procedure are guilty of reading the witty reform propaganda and other literature which, as you know, are to be found among the advertisements in the back of the *Journal of the American Medical Association*. To those who despair of seeing the day when the chemist will laugh at the bumpkin who offers him a janitor's salary I drop this pearl of wisdom and thus pass on.

Design of Column Stills With Continuous Decanters

Lewis Equations Extended to Cover Partly Miscible Liquids and Specific Application Illustrated by Calculating Design of Continuous Furfural Still

By Gerald H. Mains
Associate Chemist, Color Laboratory, Bureau of Chemistry

THE comparatively simple equations for rectification as derived by Lewis[1] have opened up new possibilities in the design of column stills and the calculation of their efficiency. Several papers have appeared describing the application of these equations, or essentially similar ones, to certain individual problems.[2]

The Lewis equations cover the general case of the separation of the components of a mixture of two miscible liquids. There are a number of instances in commercial practice where the substances to be separated are only partly miscible with each other. In some of these cases the distillate from a solution of two components with one liquid phase consists, when cooled, of a solution containing two liquid phases. Frequently one of the components may then be separated from the other in a fairly pure state by decantation, and a column still with continuous decanter may be advantageously used in handling such a system. An extension of the Lewis method to fit such cases is developed in this article, and its application to a specific problem, the separation of furfural from water, is considered.

Equations for Continuous Decantation

The diagram of a continuous still, with provision for decantation, is shown in Fig. 1. Except for the new factors involved the notation is that used by Lewis.[3] The assumptions are made that the feed enters at its boiling point, that there is a negligible heat loss from the column, and that the two components of the system have practically the same molar heat of vaporization, so that the mols of vapor passing upward through the column will be constant. The mols of reflux passing downward will be constant from plate to plate for each of the three sections of the column, being augmented in the middle section by the reflux returning from the decanter, and in the bottom section by the entering feed.

Notation

Let any variable plate in the section below the feed be m and the plate above it, $m + 1$. Plates in the middle section are designated as q, $q + 1$, etc., and in the upper section as n, and $n + 1$. Let x and y represent mol fractions of the more volatile component in the liquid and vapor phases, respectively. In the case of partly miscible liquids, the term "more volatile component" does not necessarily mean the one with lowest boiling point, but the one the concentration of which is greater in the vapor than in the liquid with which it is in equilibrium, for the particular portion of the liquid-vapor composition curve under consideration. V mols of vapor pass up the column per unit time, while the molar quantity of liquid flowing as reflux down the column for any particular section is designated R. The subscripts m, n and q refer to the point of origin of the particular vapor or liquid—for example V_q mols of vapor of composition y_q arise from the liquid of composition x_q on plate q, while R_{q+1} mols of reflux flow down from the plate above. The subscripts f and c refer to feed line and condenser, respectively, and d and p to the decanter return line and to the decanter product.

Other symbols used in the discussion are tabulated as follows:

R_f = mols of feed per unit time.
x_f = mol fraction of more volatile component in feed.
R_w = mols of waste per unit time.
x_w = mol fraction of more volatile component in waste.
V_c = mols distillate from column per unit time.
y_c = mol fraction of more volatile component in distillate.
R_c = mols reflux returned to top of column per unit time.
R_d = mols reflux returning from decanter per unit time.
x_d = mol fraction of more volatile component in decanter reflux.
P = mols product coming from decanter per unit time.
x_p = mol fraction of more volatile component in product.
R'_{q+1} = theoretical minimum reflux from plate q + 1 per unit time.
$\frac{dx}{dp}$ = rate of increase in concentration of liquid from plate to plate; also known as rate of rectification or enrichment.
k = plate efficiency, or ratio of theoretical to actual number of plates required.

Derivation of Equations

Equating total input and output for the column,

$$R_f = V_c + R_w - R_d = R_w + P \qquad (1)$$

The input and output of the more volatile component are also equal, or

$$x_f R_f = y_c V_c + x_w R_w - x_d R_d = x_w R_w + x_p P \qquad (2)$$

For any stated amount of distillate, V_c mols, the mols

Eightieth Contribution from Color Laboratory, Bureau of Chemistry, Washington, D. C.

[1] Lewis, W. K., *J. Ind. Eng. Chem.*, vol. 14 (1922), pp. 492-497.

[2] Peters, W. A. Jr., *J. Ind. Eng. Chem.*, vol. 14 (1922), pp. 476-479; Robinson, C. S., *J. Ind. Eng. Chem.*, vol. 14 (1922), pp. 480-481; Rodebush, W. H., *J. Ind. Eng. Chem.*, vol. 14 (1922), pp. 1036-1037.

[3] *J. Ind. Eng. Chem.*, vol. 14 (1922), p. 493. See also Chap. X, "Elements of Fractional Distillation," by C. S. Robinson, McGraw-Hill Book Co., 1922.

of corresponding reflux R_d returned to the column from the decanter may be found in terms of the mol fractions of more volatile component in the distillate, product and decanter reflux. Since

$$P = V_c - R_d \tag{3}$$

then $x_p P = y_c V_c - x_d R_d$

and $x_p P = x_p V_c - x_p R_d$

Whence $$R_d = \frac{x_p - y_c}{x_p - x_d} V_c \tag{4}$$

The value of P immediately follows from (3) and (4),

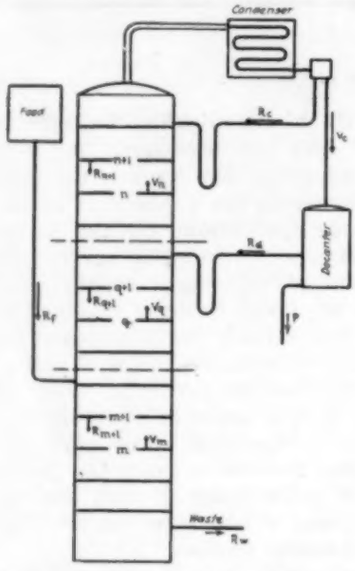


Fig. 1—Continuous Still With Decanter

and the values of R_f and R_w may be calculated by solving (1) and (2) simultaneously.

For the middle section of the column, and considering the portion between the plates q and $q + 1$, the quantity of upward moving vapor, V_q, is equal to that of the downward reflux, R_{q+1}, plus the material, the product P, not returning to the column. Then

$$V_q = R_{q+1} + P \tag{5}$$

Now $y_q V_q = x_{q+1} R_{q+1} + x_p P$

and $y_q V_q = y_q R_{q+1} + y_q P$

Solving simultaneously,

$$x_{q+1} = y_q - \frac{P}{R_{q+1}} (x_p - y_q)$$

from which may be written

$$x_{q+1} - x_q = (y_q - x_q) - \frac{P}{R_{q+1}} (x_p - y_q) \tag{6}$$

The term $x_{q+1} - x_q$ is the increase in concentration from plate to plate, or rate of rectification, and may be considered for the present purposes as identical with $\frac{dx}{dq}$, or the slope of the curve drawn between x, concentration of liquid, and q, the number of the plate. Therefore

$$\frac{dx}{dq} = (y_q - x_q) - \frac{P}{R_{q+1}} (x_p - y_q) \tag{7}$$

For an infinite number of plates, the reflux necessary for complete rectification will be a minimum. The rate of rectification, $\frac{dx}{dq}$, will approach zero, and the value of the minimum reflux, R'_{q+1}, for any plate determined from equation (7) will be

$$R'_{q+1} = P \frac{x_p - y_q}{y_q - x_q} \tag{8}$$

The foregoing development of equations for minimum reflux and rate of rectification in the middle section of the column follows closely that of Lewis, whose original equations held for the upper and lower sections.

From the basic equations

$V_n = R_{n+1} + V_c$, and $R_w = R'_{m+1} - V_m$

Lewis shows that:

$$\frac{dx}{dn} = (y_n - x_n) - \frac{V_c}{R_{n+1}} (y_c - y_n) \tag{9}$$

$$\frac{dx}{dm} = (y_m - x_m) - \frac{R_w}{R_{m+1}} (y_m - x_w) \tag{10}$$

$$R'_{n+1} = V_c \frac{y_c - y_n}{y_n - x_n} \tag{11}$$

$$R'_{m+1} = R_w \frac{y_m - x_w}{y_m - x_m} \tag{12}$$

The equations for rate of rectification assume equilibrium between the upward moving vapor and the liquid on the plate through which it passes, and can be used to calculate the theoretical minimum number of plates necessary for rectification with any given reflux to the top of the column. The actual number of plates required for the same rectification will be greater than this figure, and the ratio of the theoretical to actual number of plates required will be the plate efficiency of the column, a factor usually designated as k.

The theoretical number of plates required for a given section of the column is obtained by integration of the equations (7), (9) or (10) between the limits of concentration, x_1 and x_2, given by the data for a particular problem, and may be determined graphically.

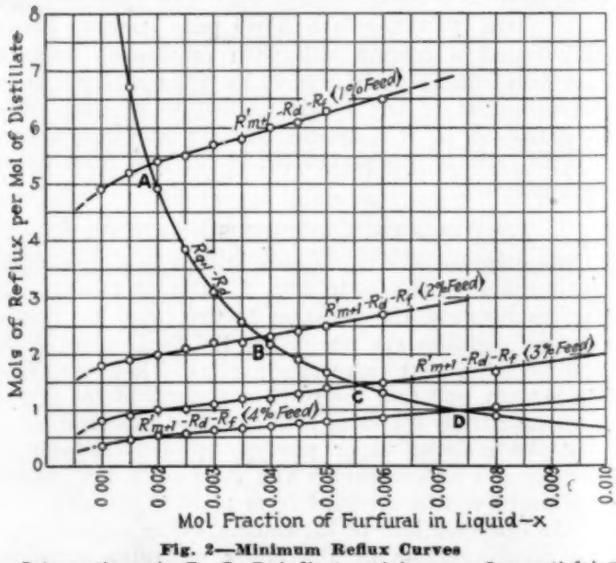


Fig. 2—Minimum Reflux Curves

Intersections *A*, *B*, *C*, *D* indicate minimum reflux satisfying entire column for 1, 2, 3 and 4 per cent feeds respectively.

The practical application of these equations will be illustrated in considering a particular problem, that of rectifying dilute solutions of furfural in water.

Application to the Concentration of Furfural Solutions

In the manufacture of furfural by the digestion of pentosan containing materials with steam[4] or dilute acids[5] a distillate is obtained consisting of a dilute solution of furfural in water, together with a small amount of impurities. Furfural is soluble in water to the extent of about 8 per cent by weight at room tem-

[4] LaForge, F. B., *J. Ind. Eng. Chem.*, vol. 15 (1923), p. 499.

[5] Meunier, G., *Comptes rendus*, vol. 174 (1922), pp. 468-470; Ricard, E., U. S. Pat. No. 1,322,054, Nov. 18, 1919; Miner, C. S., *Chem. & Met.*, vol. 27 (1922), p. 300.

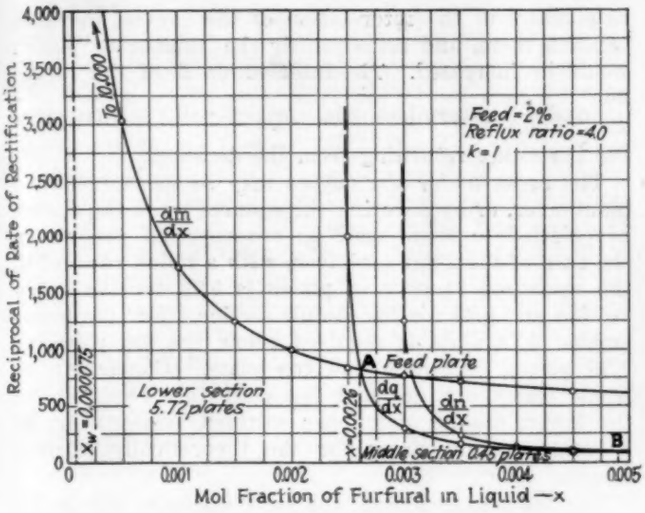


Fig. 3—Curves for Calculating Number of Plates
Intersections *A* and *B* indicate liquid concentrations in column at which feed and decanter reflux should respectively enter.

perature. By distilling solutions containing more than 2 per cent furfural, a concentration higher than 8 per cent is obtained in the vapor, from which, upon cooling, the excess furfural separates as a lower layer, composed at room temperature of approximately 95 per cent furfural and 5 per cent water. The 95 per cent furfural layer, which is the technical furfural of the trade, is separated by decantation. A continuous column still provided with a continuous decanter has been satisfactorily used for more than a year in the Bureau of Chemistry experimental plant for furfural production.[6]

The relation between liquid and vapor composition and other properties of the system furfural-water have been studied by the author,[7] and some of the data thus obtained will be used for the calculations to follow.

Computations for 2 Per Cent Feed

The distillate from the column is a constant boiling mixture of furfural and water, containing 35 per cent furfural by weight and boiling at 97.9 deg. C. The

[6] *Ind. Eng. Chem.*, vol. 15 (1923), pp. 823-829.
[7] *Chem. & Met.*, vol. 26 (1922), pp. 779-784, 841-843.

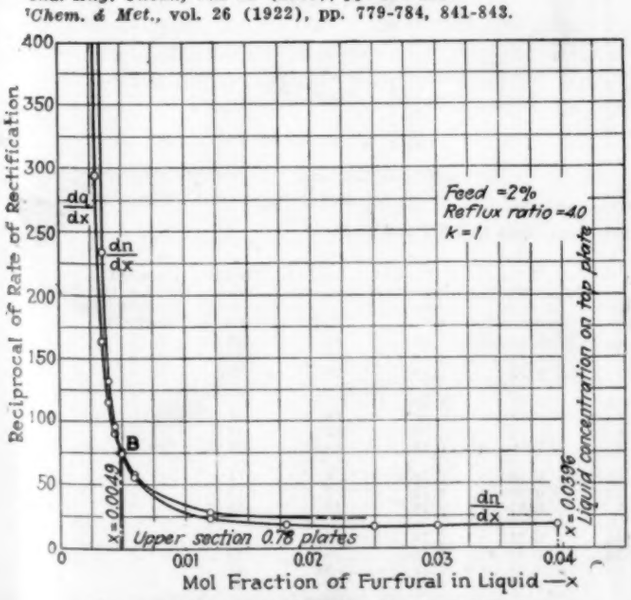


Fig. 4—Curves for Calculating Number of Plates
Intersection *B* indicates liquid concentration in column at which decanter reflux should enter.

Table I—Minimum Reflux for Various Sections of the Column
(2 Per Cent Feed)

Mol Fraction of Furfural In Liquid x	In Vapor y	Mols Minimum Reflux per Mol Distillate—Upper Section R'_{n+1}	Middle Section R'_{q+1}	Lower Section R'_{m+1}
0.000075	0.00038	.....	....	20.2
0.00050	0.00388	.....	....	22.7
0.00100	0.00765	.....	11.3	23.0
0.00150	0.0113	8.21	7.61	23.1
0.00200	0.0148	6.01	5.81	23.2
0.00250	0.0181	4.72	4.74	23.3
0.00300	0.0214	3.82	4.01	23.4
0.00350	0.0246	3.18	3.47	23.4
0.00400	0.0276	2.72	3.09	23.5
0.00450	0.0304	2.37	2.81	23.6
0.00500	0.0331	2.09	2.58	23.7
0.00600	0.0384	1.65	2.22	23.9
0.00800	0.0475	1.12	1.80	....
0.0100	0.0552	0.807	1.56	....
0.0120	0.0617	0.603	1.40	....
0.0140	0.0672	0.461	1.30	....
0.0160	0.0718	0.357	1.23	....
0.0180	0.0757	0.277	1.18	....
0.0200	0.0792	0.211	1.15	....
0.0250	0.0857	0.0989	1.11	....
0.0300	0.0897	0.0335	....	....
0.0350	0.0912	0.00889	....	....
0.0396	0.0917	0.00000	....	....

product and reflux from the decanter contain approximately 95 per cent and 8.8 per cent furfural, respectively, at 22 deg. C. The solubility of furfural in water at 22 deg. C. was determined as 8.4 per cent, but some small drops of furfural are entrained from the decanter, and 8.8 per cent represents nearly the actual conditions obtained. The concentration of the feed liquor, or dilute furfural solutions handled, may vary from 1 to 4 per cent, depending upon the digestion process used. The computations for the case of the 2 per cent feed will be described rather fully. The furfural concentration in the waste will be taken at 2 per cent of the concentration of the feed, or 0.04 per cent. This allows approximately a 98 per cent recovery, and has been equaled in practice.

Stating the concentrations in mol fractions (mol. wt. of furfural, $C_4H_3O.CHO = 96$), the following conditions exist:

$$x_f = 0.00381,\ y_c = 0.0917,\ x_d = 0.0178,\ x_p = 0.781,\ \text{and}\ x_w = 0.000075.$$

For simplicity, the calculations are based on 1 mol of distillate, $V_c = 1$. Then, from (4) the quantity of reflux from the decanter is

$$R_d = \frac{x_p - y_c}{x_p - x_d} V_c = 0.903 \text{ mols}$$

From (3), $P = 1 - R_d = 0.097$ mols, the quantity of product. The amount of feed corresponding to 1 mol of distillate is, by simultaneous solution of (1) and (2),

$$R_f = \frac{x_p - x_w}{x_f - x_w} p = 20.3 \text{ mols}$$

Also, $R_w = R_f - P = 20.2$ mols, the quantity of waste from the bottom of the column.

Minimum Reflux

Since the points of entrance into the column of the decanter reflux and feed liquor are yet to be determined, the minimum reflux for each of the sections in turn must be calculated over the entire column, or at least over a large portion of it. The values of minimum reflux, R'_{n+1} R'_{q+1} and R'_{m+1}, calculated by the use of equations (8), (11) and (12) for various plate liquid concentrations, x, are presented in Table I. The values for y, mol fraction of furfural in the vapor, are taken from a liquid-vapor composition curve calculated in mol fractions from the weight percentage curve given in the author's article on the system furfural-water.[8] The data in Table I and other tables

[8] *Chem. & Met.*, vol. 26 (1922), p. 784.

are calculated by using a slide rule and are given to three significant figures.

Having determined the manner in which the minimum reflux varies throughout the column, the actual reflux to the top of the column which will meet the minimum requirement for all points in the column may be readily determined from Table I. By subtracting R_d from the values of R'_{q+1} and $R_d + R_f$ from the values of R'_{m+1}, the reflux to the top of the column which satisfies conditions at various points in the two lower sections may be determined.

These data are given in Table II, for the lower portions of the column. In the problem at hand the reflux satisfying the middle and lower sections will be more than ample for the upper section of the column. This being the case, the intersection of the curves formed by plotting $(R'_{q+1} - R_d)$ and $(R'_{m+1} - R_d - R_f)$ against x, as in Fig. 2, determines the minimum reflux that will satisfy the entire column. For a 2 per cent feed the minimum reflux is approximately 2.3 mols, or the reflux ratio is 2.3:1.

Number of Plates

An infinite number of plates would be necessary to effect separation, using the minimum reflux determined. To ascertain how the number of plates varies with change in the reflux, several definite values of reflux higher than the minimum are chosen, and the corresponding number of plates is calculated in each case.

Select, for example, a reflux of 4 mols. The values of $\frac{dx}{dn}$, $\frac{dx}{dq}$ and $\frac{dx}{dm}$ are obtained from equations (7), (9), and (10). When the reciprocals of these values, or $\frac{dn}{dx}$, $\frac{dq}{dx}$, $\frac{dm}{dx}$, are plotted against values of x, the area underneath the curves is a measure of the number of plates required. Table III gives the calculated values for $\frac{dn}{dx}$, $\frac{dq}{dx}$ and $\frac{dm}{dx}$, and Figs. 3 and 4 show the curves plotted from them.

The intersection of the curves $\frac{dm}{dx}$ and $\frac{dq}{dx}$, as was shown by Lewis, determines the liquid concentration in the column at which the feed should enter. In the present case, the concentration at the intersection A is 0.0026 mol fraction of furfural, or 1.4 weight per cent. An inspection of Fig. 3 will show that if the feed should enter at any point other than that corresponding to the intersection of the curves, the area beneath them, and consequently the number of plates, would be increased. The intersection B of the curves $\frac{dq}{dx}$ and $\frac{dn}{dx}$ determines the correct point of entrance for the reflux returning from the decanter.

The areas under the curves may be measured by a planimeter, or by counting the squares when the curves are plotted to large scale on cross-section paper. In the case of the 2 per cent feed, with a reflux ratio of 4, the measured number of plates is 5.72 for the lower section and 0.45 for the middle section. For the upper section 0.78 plate is required below the top plate, or 1.78 plates, including the top plate. Converting to whole plates, six, one and two plates are required for the lower, middle and upper sections, respectively, or a total of nine plates for the theoretically efficient column.

For the actual column, the plate efficiency k must be

Table II—Calculated Minimum Reflux to Top of Column

x	$R'_{q+1} - R_d$ Mols	$R'_{m+1} - R_d - R_f$ Mols Minimum Reflux— 1 Per Cent Feed	2 Per Cent Feed	3 Per Cent Feed	4 Per Cent Feed
0.00100	10.4	4.9	1.8	0.8	0.36
0.00150	6.71	5.2	1.9	0.9	0.46
0.00200	4.91	5.4	2.0	1.0	0.52
0.00250	3.84	5.5	2.1	1.0	0.57
0.00300	3.11	5.7	2.2	1.1	0.62
0.00350	2.57	5.8	2.2	1.2	0.66
0.00400	2.19	6.0	2.3	1.2	0.70
0.00450	1.91	6.1	2.4	1.3	0.75
0.00500	1.68	6.3	2.5	1.4	0.79
0.00600	1.32	6.5	2.7	1.5	0.87
0.00800	0.90	...	...	1.7	1.05
0.0100	0.66	...	...	2.0	1.23
Minimum Reflux Satisfying Entire Column	....	5.35	2.3	1.45	1.0

Table III—Reciprocals of Rectification Rates

Feed = 2 per cent, Reflux ratio = 4.0 and k = 1

x	$\frac{dn}{dx}$	$\frac{dq}{dx}$	$\frac{dm}{dx}$
0.000075	.....	.....	10,000
0.00050	.....	.....	3,030
0.00100	.....	.....	1,725
0.00150	.....	—185	1,250
0.00200	.....	—417	1,000
0.00250	.....	+2,000	833
0.00300	1,250	294	769
0.00350	233	164	715
0.00400	132	115	.....
0.00450	95.2	90.9	625
0.00500	74.6	75.2	.....
0.00600	55.6	56.5	588
0.00800	.....	.....	667
0.0100	.....	.....	1,000
0.0120	23.7	28.2	.....
0.0180	18.6	.....	.....
0.0250	16.9	.....	.....
0.0350	17.8	.....	.....
0.0396	19.2	.....	.....

Table IV—Rectification Data*

(Calculated for 1 mol of distillate per unit time, equal to 0.097 mol product.)

Concentration of Feed, Per Cent	Reflux to Top of Column, Mols	R_q Mols	R_m Mols	Furfural Cone. Wt. Per Cent Feed Plate	Decanter Reflux Plate	Number of Plates (k = 1) Lower Sec.	Middle Sec.	Upper Sec.	Total	Total Plates Required (k = 0.5)	Lb. Steam Required Per Lb. of Technical Furfural	Ratio of Exhausting and Rectifying Section Areas R_m/R_q
1	7.0	7.9	48.8	0.83	2.1	8.49	0.64	1.78	12	23	15.5	6.2
	6.0	6.9	47.8	0.91	2.3	15.6	0.78	1.78	19	38	13.5	6.9
	5.5	6.4	47.3	0.92	2.4	24.1	0.78	1.78	28	55	12.6	7.4
2	4.0	4.9	25.2	1.4	2.6	5.72	0.45	1.78	9	17	9.7	5.1
	3.0	3.9	24.2	1.8	2.8	10.7	0.50	1.78	14	27	7.7	6.2
	2.5	3.4	23.7	2.0	3.2	18.6	0.70	1.78	22	44	6.8	7.0
	2.3	3.2	23.5	2.0	3.4	48.4	1.5	1.78	53	104	6.4	7.3
3	4.0	4.9	18.3	1.5	2.6	2.84	0.30	1.78	6	11	9.7	3.7
	3.0	3.9	17.3	1.9	2.8	3.93	0.33	1.78	7	13	7.7	4.4
	1.5	2.4	15.8	2.9	4.1	15.7	0.95	1.78	19	38	4.8	6.6
4	4.0	4.9	14.84	1.7	2.6	1.86	0.21	1.78	5	9	9.7	3.0
	3.0	3.9	13.84	2.0	2.8	2.28	0.22	1.78	6	10	7.7	3.6
	1.5	2.4	12.34	3.1	4.1	5.83	0.38	1.78	9	17	4.8	5.1
	1.1	2.0	11.94	3.7	5.0	10.2	0.67	1.73	14	27	4.1	6.0

* In terms of weight per cents and mol fractions the furfural concentrations assumed are: Distillate, 35 per cent = 0.0917; decanter reflux, 8.8 per cent = 0.0178; product, 95 per cent = 0.781; waste = 2 per cent of feed).

taken into account. Peters[9] has shown that for most binary liquids k lies between 0.5 and 0.7. Using the value 0.5, 12, one and four plates are obtained for the column under consideration. Thus with a reflux ratio of 4, a seventeen-plate column would be required to recover 98 per cent of the furfural in a 2 per cent feed and deliver it as 95 per cent product.

Similar calculations have been made for reflux ratios of 3, 2.5 and 2.3. All these results together with corresponding data for 1, 2 and 3 per cent feeds have been summarized in Table IV.

Fig. 5 shows, for the 2 per cent feed, the relation between number of plates and reflux ratio both for theoretical efficiency and for $k = 0.5$. As the reflux ratio becomes larger the number of plates required is smaller, approaching a minimum with infinite reflux. This minimum will be the actual number of steps theoretically required to go from the concentration of the waste to that of the distillate and may be determined from the liquid-vapor composition curve. In the case here considered, slightly more than four steps would be required or a minimum of 5 plates when $k = 1$.

Steam Consumption

In rectifying furfural-water mixtures, steam is admitted directly to the bottom of the column. For a column with any given number of plates, steam consumption is determined by the reflux ratio and is the amount necessary to vaporize the sum of distillate and reflux. As the furfural distillate comes over at about 98 deg. C., it may be assumed that 1 mol of steam will vaporize 1 mol of liquid of the composition of the distillate. For a reflux ratio of 4, 5 mols steam will be required for 1 mol distillate or 0.097 mol product. Converting to weights, 9.7 lb. steam (atmospheric pressure) will be required to produce 1 lb. technical furfural. Heat lost by radiation and in interchangers will increase this somewhat in practice.

With a large number of plates, steam and condensing water consumption and consequently operating cost will be reduced, but fixed charges will be higher owing to increased investment. The steam consumption curve has the same slope as the reflux ratio curve. From inspection of the latter, Fig. 5, it is evident that the slope above twenty-seven plates ($k = 0.5$) is so steep that further increase would make little change in steam consumption. The upper practical limit for a 2 per cent feed is consequently about twenty-seven plates.

[9] *J. Ind. Eng. Chem.*, vol. 14 (1922), p. 478.

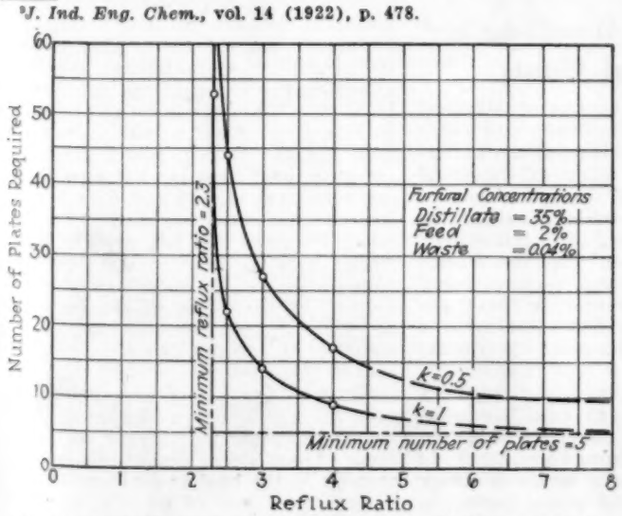


Fig. 5—Relation Between Reflux Ratio and Number of Plates

Table V—Variation of Steam Consumption With Feed Concentration
(No. of plates = 27, $k = 0.5$)

Concentration of Feed Wt. Per Cent	Required Reflux Ratio	Lb. Steam Required Per Lb. of Technical Furfural
1.0	6.6	14.7
2.0	3.0	7.7
3.0	1.7	5.2
4.0	1.1	4.1

Table V shows the variation of steam consumption with feed concentration for a twenty-seven-plate column.

In order to obtain the same efficiency of fractionation in the lower or exhausting section of the column as in the rectifying sections, while maintaining the same depth of liquid on the plates, the area of the exhausting section must be greater than that of the upper sections, because more reflux must be handled. The ratio of R_m to R_q is the ratio of required cross-sections. Values for this ratio are given in the last column of Table IV.

The calculations that have been made cover the range of conditions generally met in commercial practice. As steam consumption is very low and the number of plates required relatively small, cost of rectification is a minor item in the production of technical furfural, even with very dilute feed. Accordingly the digestion process may be operated under conditions insuring maximum yield and minimum digestion cost, without being limited by the necessity of obtaining a high concentration of furfural in the product to be rectified.

It is obvious that the equations and method of treatment may be applied to other partly miscible binary systems in which decantation is now used or might be used. Of commercial importance are mixtures of the following with water: phenol, benzaldehyde, paraldehyde, amyl and butyl alcohols and aniline.

Steel to Be Produced Directly From Ore at Ford Plant

A recent article in *Chem. & Met.* reviewed the many methods by which attempts have been made to produce on a commercial scale wrought iron directly from the ore. Recent developments have brought into the limelight one of the most promising of these methods, that of Bourcoud. At the River Rouge plant of the Ford Motor Company there is nearing completion a complete installation of the Bourcoud process for use in the direct production of steel. The installation is under the supervision of Dr. Bourcoud, originator of the process, a former chemical engineer, who has been working on the direct reduction of iron from the ore for many years.

The Bourcoud method for reduction by gas is in no way similar in practical operation to the present methods of steel manufacture. In theory it is based upon the gas reduction of the ore as effected in the blast furnace, but the mechanism by which this reduction is accomplished is a complete departure from present methods. Its adoption would be revolutionary in character, for the blast furnace, the open hearth and the bessemer converter become unnecessary. Good coking coal is unnecessary and any fuel, including oil, can be utilized as long as it can be gasified.

Information has just been received that the first series of tests, which consisted of the gasification of powdered coal, have been completed and have given general satisfaction.

Equipment News

From Maker and User

Cast-Iron Storage Tanks

Tanks of the silo type are widely used for the storage of material in chemical and allied plants, particularly in connection with conveyor systems. While, in the past, such tanks have mostly been constructed of concrete, various considerations have recently led the Conveyors Corporation of America, Chicago, Ill., to place a sectional cast-iron tank of silo type on the market. It is claimed that this tank has decided advantage over wood, steel or concrete tanks because of permanent, sturdy structure, low maintenance costs, long life and ease of erection. It is recommended particularly in the chemical engineering field for materials such as sand, crushed rock, coke, sugar beets, fullers earth, gilsonite, kieselguhr, bauxite, potash, animal charcoal, etc.

The construction is evident from the accompanying cuts. It is cylindrical in shape, erected on a 6-in. reinforced concrete slab, which is supported on a structural steel base or tower, built up of standard fabricated structural shapes. The body of the tank proper is built up of ½-in. cast-iron radius plates, each 2x2 ft. in size. The plates are held vertically between cast-iron H-sections, which are built in 2 and 4 ft. lengths, thus permitting the tank to be of any convenient height.

The tank is covered with a cast-iron top, and connections can be made for any type of equipment. It is equipped with a steel ladder. All inside joints of the tank are sealed with a special cement mixture, which insures tightness. The design of the tank joints prevents leakage through any part of the tank. The supporting structure is built of various heights to conform to local conditions, with sufficient clearances for wagons, trucks or railroad cars, as the case may be.

Each tank is equipped with two 24x24-in. undercut gates, which allow a maximum tonnage to be withdrawn from the tank. A positive and rapid discharge can be thus effected at all times.

A rolled steel angle at the base, together with steel rods resting on lugs, running completely around the tank, prevents side thrust and eliminates the necessity of structural supports about the tank proper. Due to its sectional design, the tank can be taken down, removed and set up in a new location should conditions warrant such action. Where desired, square tanks are designed in place of the cylindrical tanks here described.

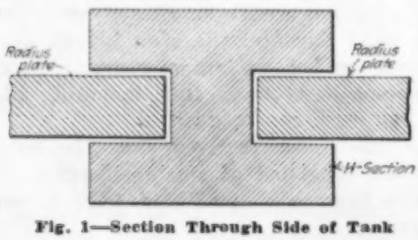


Fig. 1—Section Through Side of Tank

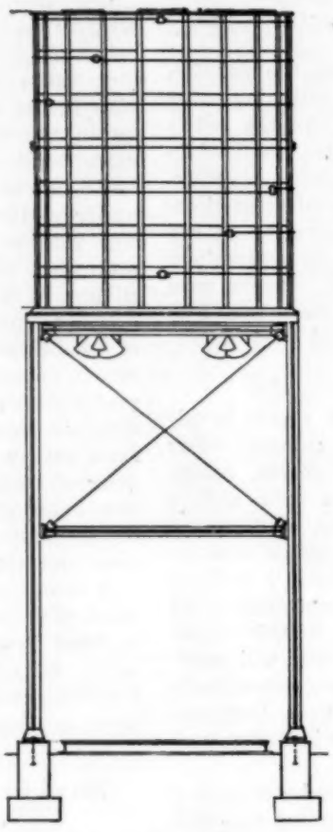


Fig. 2—Elevation of Cast-Iron Tank as Installed

Coal and Ash Handling for Industrial Plants

Through the introduction of advanced types of conveyor machinery and material equipment, the Fisher Body Co. has been able to solve many of the problems that have worried plant managers in the handling of coal and ashes for their power houses. So successful have the installations been that the Fisher Body Co. has duplicated them in every one of its plants since the first one was erected by the Stearns Conveyor Co., of Cleveland, to meet its special requirements.

The installation that is serving as a pattern for others is that used in plant No. 18 in Detroit. It consists of a 500-ton capacity steel storage bin, 20 ft. in diameter and 55 ft. high; a track hopper; reciprocating plate feeder; a 20x30-in. two-roll crusher; 20x15x7½-in. gravity discharge conveyor; and a 1-ton power-propelled weigh larry, for the coal handling. The ash-handling system consists of a 40-cu.ft. capacity ash skip; a 40-cu.ft. capacity steel rocker bottom ash car, and a 16-ft. diameter by 16-ft. deep reinforced tile silo.

The lump coal is brought in and is discharged into the track hopper, from where it is fed by means of the plate feeder into the two-roll crusher, which reduces it to 1¼ in. and under in size, at the rate of 50 tons per hour. It is then discharged into the gravity discharge elevator and elevated into the steel storage bin.

The arrangement provided for this steel storage bin is unique in that it provides a live storage of 60 tons. As soon as this live storage bin is filled the coal flows to the reserve storage. One of the vital points of this arrangement is the device that insures against coal going to the reserve storage until the live one is filled. Coal from the live storage is spouted directly to the boiler room, there being a weigh larry traveling the entire length of the plant. It is so set up as to draw a charge of coal and weigh it into each individual boiler. It is also power propelled and set so that the operator can ride on this machine when filling the stoker hoppers. On the scales is provided an automatic feature incorporating a card-punching system, so that the operator can keep a record of just what coal has been delivered to each boiler.

In addition to the coal in the live storage, the Fisher job provides a reserve storage of 440 tons. This can be drawn from the lower portion of the bin by means of an automatic feeder and re-elevated into the live storage, so that the fuel is constantly at hand when needed, without involving any loss of time or additional labor.

This type of coal-handling equipment makes it possible for the architect or builder to design a power plant entirely independent of a coal bunker, which has generally had to be placed inside of the building. Fisher people report that by leaving this bunker on the outside, not only has economy in power plant construction been possible but also that a large amount of dirt and dust is eliminated. Earl Stearns, head of the firm which designed this job, reports that it makes possible much better light and ventilation and saves considerable money in the design of the structure, as it does not require any heavy columns to support the weight of the coal in the bunker.

Through the use of an outside storage in what appears like an ordinary round silo of the type seen on farms, made from durable but inexpensive materials, the bunker construction cost is less than half of what it would be in the suspended type. Where a sus-

pended bunker is used and placed inside of the boiler room, and coal spouted directly to the stoker hoppers, there is always a large amount of coal that remains in these bunkers which cannot be moved. For example, a bunker may be rated at a capacity of 300 tons, but only 200 tons is available for use without shoveling. With the silo type bunker, every pound of coal can be reclaimed, it is said. In this particular job much care was given to the method of handling ashes from the power plant. They are drawn from large storage bins in underneath the stoker, and then are discharged directly into the Stearns rocker bottom dump car. The car has a capacity of 40 cu.ft. and is mounted on large diameter wheels, operating on roller bearings. It is set to travel the entire length of the boiler room.

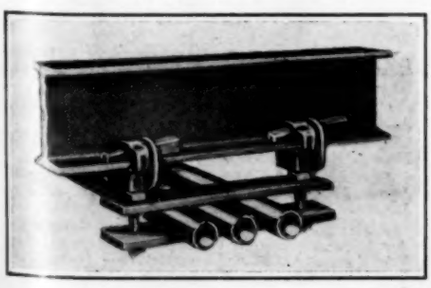
The ashes are discharged into a storage hopper alongside of the ash track, which delivers them to a 40-cu.ft. capacity ash skip. They are then elevated by means of an electric hoist, and discharged into an ash storage silo. The construction of the floor of the silo is such as to provide a drainage away from the lower openings, thus preventing freezing in winter from blocking the openings. The ashes are delivered to the railroad cars by two hinged and counterweighted spouts.

The particular installation is one of four silo coal systems which the Stearns Conveyor Co. has erected for the Fisher Body Co. The other plants are the Turnstead Manufacturing Co., a subsidiary of the Fisher, located in Detroit; the Mansfield Stamping Co. and the Fisher Body Co. plant at Memphis, Tenn.

A Handy Pipe Hanger

Certainly no other group of industries uses so much piping or is so interested in everything pertaining thereto as the chemical engineering industries. One of the chief difficulties in connection with the extensive installations of piping encountered in these industries is that of supplying proper supports for the pipe. For this reason there will undoubtedly be much interest in a handy pipe hanger that was developed for the support of electrical conduits but can be as well applied for the support of other types of pipe line.

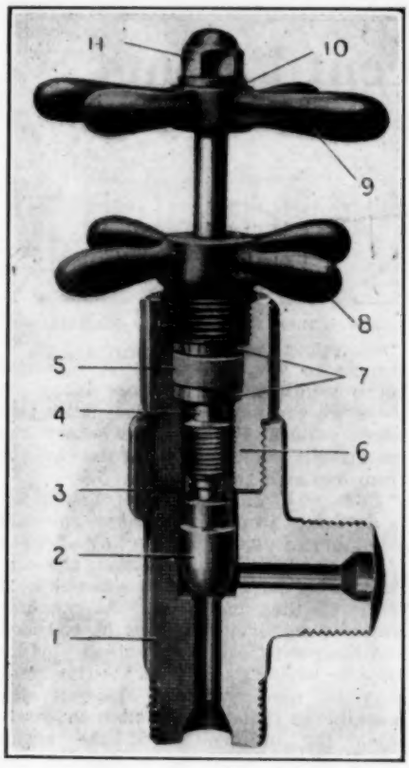
This hanger, called the "Wedgtite," is made by Crouse-Hinds Co., Syracuse, N. Y. It consists of two pieces, a hook and a wedge. The wedge, which is interchangeable with all types and sizes of hooks, is provided with saw



Type CHU Pipe Hanger Installed

teeth so that vibration will not cause it to loosen. As will be noted from the illustration, the hangers fasten directly to the flanges of the beams, the wedges holding them in place. They can be used with any I-beam, channel, or other structural member if the flange is not less than $\frac{1}{4}$ in. thick at the edge and not more than $\frac{3}{8}$ in. thick $\frac{3}{4}$ in. from the edge.

These hangers are made in three types: CHP, CHR and CHU. Type CHP is for a single pipe running parallel with the beam. Type CHR is for a single pipe running at right angles to the beam, and type CHU is for several pipes suspended underneath the beam at right angles. The first two types are for pipes from $\frac{1}{2}$ to 2 in., while type CHU can be used with any size pipe.



Valve for Oxygen Manifolds

Valve for Oxygen Manifolds

To provide satisfactory valves for an oxygen manifold, where the pressures carried are very high, has always presented a problem. After a study of many different designs, the Oxweld Acetylene Co., 30 East 42nd St., New York City, believes, however, that it has developed a valve which meets every requirement. This valve is shown in the accompanying cross-sectional cut.

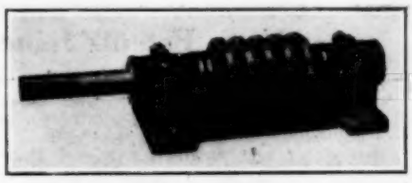
The body, 1, has a formed seat receiving the stem tip, 2. This tip is attached to and carried by the stem, 4, by means of a swivel joint. Thus the tip is enabled to seek its own natural seat in the body. The stem screw is in the inner end of the stuffing box, 6, which is made gas tight into the body by means of the lead gasket, 3. The stem itself is made gas tight by the rubber packing, 5, which is compressed between packing rings, 7, by means of the hand wheel and nut, 8.

Care has been taken in the design of this valve to make it as safe as possible. If the operator should happen to unscrew the hand wheel all the way, there is no possibility of the internal parts being blown out by pressure, because the stem screws into the stuffing box. Even if he should unscrew both the stem and the hand wheel, the parts could not come out, because the large end of the stem would lodge against the inner end of the stuffing box.

Double Thrust Worm Box

With the increased use of individual motor drives for plant equipment the use of the worm and wheel, which serve the combined purposes of speed reducer and power transmission, has widely increased. In this connection it has become evident to all users of this type of drive that its proper operation largely depends on the maintenance of the proper relative positions of the worm and wheel.

To achieve this end, the W. A. Jones Foundry & Machine Co., Chicago, Ill., has designed the double thrust worm box shown in the accompanying cut. This box, for use with open drives, is claimed to provide an accurate and rigid support for the worm. It is so designed that the worm operates in oil. Thrust washers consisting of a hard



Double Thrust Worm Box

fiber washer operating between two steel washers are provided at each end of the worm. The bearings are babbitted and bored, and faced on the ends.

These boxes are made to take standard cut steel worms such as those made by the same company. They are recommended for use on open drives where it is not desired to incur the expense of a completely inclosed unit.

Manufacturers' Latest Publications

Hooker Electrochemical Co., 25 Pine St., New York City.—Bulletin 4. A pamphlet discussing chemical tests for bleach liquors.

Roller-Smith Co., 233 Broadway, New York City.—Several bulletins, as follows: No. 200, describing portable, direct reading rail bond testers; No. 100, describing a line of electrical instruments for signal system testing; No. 430, describing direct current switchboard instruments; No. 550, describing direct current relays and direct and alternating current time limit relays.

Steere Engineering Co., Detroit, Mich.—Bulletin 40. A catalog describing the use of electro-sherardizing as a corrosion preventive in the gas works.

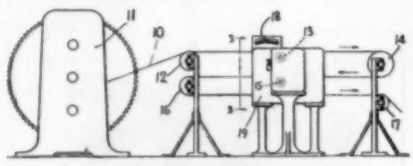
Allis-Chalmers Mfg. Co., Milwaukee, Wis.—Catalog 1632G. A new edition of this company's general catalog of centrifugal pumps and pumping units, giving full and up-to-date information on this equipment.

Review of Recent Patents

Weighing Moving Sheet Material

Martin Castricum, of Springfield, Mass., has modified the machines for weighing moving sheets, such as rubberized fabric, so that accurate weight may be obtained regardless of the width of the sheet. Material 10 passes over an idler 12, over a scale roll 13, around another idler 14, over a second scale roll 15 and then over idlers 16 and 17. No matter at what speed the material is moving, the length between rolls 12 and 14 and between 14 and 16 is always constant, and therefore, if the weight (and width) is uniform, the weight of fabric resting on the scale rolls 13 and 15 will always be constant. The scale rolls are supported from a common scale arm which can be counterbalanced for the standard weight desired, and variations from this standard detected by an indicator 18 actuated by the scale mechanism.

The scale as thus far described will indicate variations in weight of the total width of the material, but will not show the influence of variations in this width. Mr. Castricum has found that by supporting portions of the material clear of the scale rolls, the effect of material of constant width will be obtained. It is desirable in some instances to vary the width of material being weighed, and in other instances to weigh the material adjacent its two edges separately, to see whether the material is running of uniform weight from one side to the other.

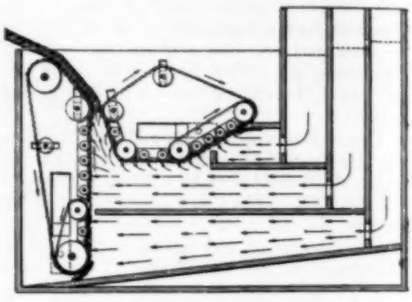


Weighing Moving Sheet Material

In front of each scale roll, 13 and 15, is an angle iron, to which are pivoted a number of plates. When any of these plates are in vertical position, the corresponding portion of the sheet is held clear of the scale roll. A constant width of material can thus be weighed and the position of the weighed portion may be varied as desired. Adjustment may be made without stopping the machine so that it is possible to determine the uniformity of the entire width of the sheet by comparing the weights registered for different portions of it. (1,500,233, assigned to Fisk Rubber Co., Chicopee Falls, Mass., July 8, 1924.)

Fiber Board Machine

By combining fine with coarse screens, John K. Shaw, of Minneapolis, Minn., has found it possible to obtain a firmly interwoven fiber board with shorter screen lengths than would ordinarily be required. The aggregate area of the meshes of the traveling screen must be large enough to carry away the waste water fast enough to interlace the fibers properly. But if at the same time the mesh is fine enough to stop all the fibers, the length of the endless screen becomes so great that the strain will pull the strands.



Fiber Board Machine

To overcome this Mr. Shaw uses a relatively short 20-mesh screen inside of a relatively longer 14-mesh screen. This arrangement also has the advantage of causing a more thorough inter-

U. S. Patents Issued August 12, 1924

Brick Machine. James R. Tackett, Olive Hill, Ky., assignor to General Refractories Co., Philadelphia, Pa.—Reissue 15,889.

Process of and Means for Nickel Plating. Edwin M. Baker, Ann Arbor, Mich., assignor to Christian Girl, Kalamazoo, Mich.—1,504,206.

Determining Boric Acid in Nickel Baths. Edwin M. Baker, Ann Arbor, Mich., assignor to Christian Girl, Kalamazoo, Mich.—1,504,207.

Making Cross-Corrugated Paperboard. Charles H. Crowell, Brooklyn, N. Y.—1,504,218.

Commercial Products from Blood. Frederic W. V. Fitzgerald, Caversham, England.—1,504,225.

Treating Liquids with Gases. Charles S. Palmer, Pittsburgh, Pa.—1,504,265.

Rustproofing with Cadmium. William A. Wissler and Chad H. Humphries, Kokomo, Ind., assignors to the Udylite Process Co., Kokomo, Ind.—1,504,298.

Brick Machine. George C. Adams, Mechanicville, N. Y.—1,504,302.

Alloy Containing Fe, Ni, Cr, W, or Mo. Pierre Girin, Paris, France, assignor to Société Anonyme de Commentry, Fourchambault & Decazeville, Paris.—1,504,338.

Monosodium Phosphate. Walter Glaeser, Brooklyn, N. Y.—1,504,339 and 1,504,340.

Electrolytic Cell. Isaac H. Levin, New York.—1,504,359.

Electric Welding. Joseph W. Meadowcroft, Philadelphia, Pa., assignor to Edward G. Budd Mfg. Co., Philadelphia.—1,504,367.

Distilling Peat. Adolphe A. F. M. Seiglo, Paris, France.—1,504,385.

Dust Collector. William B. Senseman, Denver, Colo.—1,504,386.

Crusher. Carl T. Anderson, Elmhurst, Ill., assignor to Webster Mfg. Co., Chicago, Ill.—1,504,412.

Azo Dye. Guillaume de Montmollin and Gerald Bonhote, Basel, Switzerland, assignors to the Society of Chemical Industry in Basel.—1,504,437.

Forming and Wrapping Oilseed Cakes. Nelson B. Henry, Atlanta, Ga., assignor to the Murray Co., Dallas, Texas.—1,504,450.

Construction of Vertical Chamber Ovens. Walther Hiby, Scheveningen, Netherlands.—1,504,451.

Saccharine Powder. George Washington, Brooklyn, N. Y.—1,504,459.

Azo Dye. Hermann Fritzsche and Emil Reber, Basel, Switzerland, assignors to the Society of Chemical Industry in Basel.—1,504,469.

Vertical Chamber Oven. Carl Otto, Copenhagen, Denmark.—1,504,492 and 1,504,493.

Silicic Acid. Francis X. Govers, New York.—1,504,549.

Gaseous Fuel. John Harris, Lakewood, Ohio, assignor to Carbo-Oxygen Co., Pittsburgh, Pa.—1,504,557.

Furnace. Norman E. MacCallum, Phoenixville, Pa.—1,504,566.

Solvent Extraction of Oils, etc. Burnell R. Tunison, New York, assignor to U. S. Industrial Alcohol Co.—1,504,588.

Removing Carbon Oxysulphide from Gas. Josef Jannek, Ludwigshafen-on-the-Rhine, Germany, assignor to Badische Anilin & Soda-Fabrik.—1,504,624.

Treating Native Arsenate Ores. James G. Lane, Denver, Colo., assignor to American Smelting and Refining Co., New York.—1,504,627.

Making Annular Tubes. Edward C. Taylor, Springfield, Mass., assignor to Fisk Rubber Co., Chicopee Falls, Mass.—1,504,653.

These patents have been selected from the latest available issue of the "Official Gazette" of the United States Patent Office because they appear to have pertinent interest for "Chem. & Met." readers. They will be studied later by "Chem. & Met.'s" staff, and those which, in our judgment, are most worthy, will be published in abstract.

Complete specifications of any United States patent may be obtained by remitting 10c. to the Commissioner of Patents, Washington, D. C.

Structure and Operation of Heating Furnaces. Willibald Trinks, Pittsburgh, Pa.—1,504,636.

Titanium Compounds. Joseph Blumenfeld, London, England.—1,504,669 to 1,504,673 incl.

Making Oxide of Antimony. Antonin Germot, Asnieres, France.—1,504,685.

Vertical Cement Kiln. Spencer B. Newberry, Cleveland, Ohio.—1,504,701.

Burning Cement Clinker. Spencer B. Newberry, Cleveland, Ohio.—1,504,702.

Paper Making Machine. William Sheahan, Ocean Falls, British Columbia.—1,504,727.

Decolorizing Carbon from Distillery Waste. Milton C. Whitaker, New York, assignor to U. S. Industrial Alcohol Co.—1,504,730.

Decolorizing Oils. Fred W. Manning, Chicago, Ill., assignor to Manning Refining Equipment Corp.—1,504,772.

Comminuting Mill. Ray C. Newhouse, Wauwatosa, Wis., assignor to Allis-Chalmers Mfg. Co., Milwaukee.—1,504,777 and 1,504,778.

Pulverizing Machine. Ralph E. H. Pomeroy, Canton, Ohio.—1,504,781.

Gypsum Plaster. Francis Mulligan, Belfast, Ireland.—1,504,829.

Drier. David S. Baker, Greenwich, Conn., assignor to National Evaporator Corp., Providence, R. I.—1,504,854.

Sweating or Crystallizing Paraffine Wax. Hugh L. Allan and James Moore, Burmah, British India, assignors to the Burmah Oil Co., Ltd., Glasgow, Scotland.—1,504,923.

Treating Nitrated Carbohydrates. Walter O. Snelling, Allentown, Pa., assignor to the Trojan Powder Co., New York.—1,504,986.

Press for Hollow Earthenware Articles. Edmund W. Leigh, Shanklin, Isle of Wight, England.—1,505,042.

Cellulose Ethers. Leon Lilienfeld, Vienna, Austria.—1,505,043 and 1,505,044.

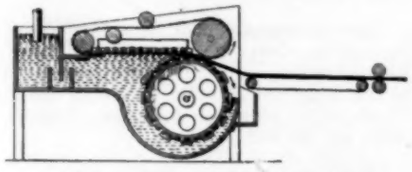
Coal-Distilling Apparatus. William F. Nagel, Ensley, Ala.—1,505,057.

Production of Gases Rich in Hydrogen. John H. West, Bayswater, and Arthur Jaques, Waterloo, England.—1,505,065.

Separation of Alkali-Metal Salts by Aqueous Ammonia. Clinton E. Dolbear, San Francisco, Calif., assignor to Industrial Research Co., San Francisco, Calif.—1,505,078.

lacing of the fibers than is possible with a single screen. By using two sets of screens and three feed compartments it is possible to use less expensive fibers in the center of the board than on the surfaces. (1,500,208, assigned to C. F. Dahlberg, of St. Paul, Minn., July 8, 1924.)

Mr. Shaw has also developed a machine for forming fiber board with undercut recesses adapted to hold plaster. As the board is being formed it passes over a large screen-covered cylinder on the surface of which have been spaced pieces of leather having the shape desired in the recesses. Because of the undercutting, these pieces tear themselves out as the board leaves the cylinder, but subsequent passage of the board between compression

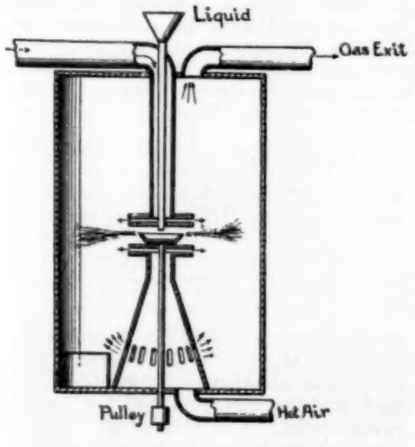


Making Recessed Fiber Boards

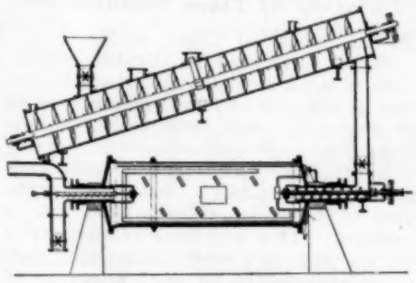
rollers presses down the torn out projections and reforms the undercut recess desired in the surface of the board. (1,500,209, July 8, 1924.)

Centrifugal Spray Evaporator

Ferdinand Wressmann, of Munich, Germany, evaporates the volatile constituents of solutions, emulsions or suspensions by flowing the liquid onto a disk rotating rigidly in a horizontal plane. Hot air or other desiccating gas comes in contact with the sheet of liquid from two directions. Part of the air enters above and below the sheet also in a horizontal plane so that it parallels the liquid. This serves to insure uniform spread of liquid by preventing interference from air eddies and by keeping individual particles of liquid from deviating too far from the prescribed path. The major portion of the air is introduced below the spray and passes up at right angles through the latter. Or it may enter through tangential ports so that it rises as a helical current. Dried material is removed through an opening at the bottom. (1,501,876, July 15, 1924.)



Centrifugal Spray Evaporator



Continuous Solvent Extractor

Continuous Solvent Extractor

Joseph Nield, of Salisbury, South Rhodesia, South Africa, has developed a continuous apparatus for extracting oils, fats or waxes by solvents. A screw conveyor is mounted in an inclined cylinder, the conveyor shaft being heated with steam. Materials to be extracted enter through a mechanical hopper at the lower end of the cylinder and pass up counter-current to the solvent. The extracted material drops through a down-take to another screw conveyor that feeds it into a rotating steam-heated drum for solvent recovery. This drum is also provided with a continuous discharge mechanism so that the entire operation is continuous. The extracted oil is separated from the solvent by distillation. (1,500,957, July 8, 1924.)

Readers' Views and Comments

An Open Forum

The editors invite discussion of articles and editorials or other topics of interest

Technology of Zirconium

To the Editor of Chem. & Met.:

Sir—In your publication of July 28 I note with interest an article by Frederick C. Nonamaker entitled "Technology of Zirconium and Its Compounds."

During the past war zirconium came to my attention in an interesting way and as I note that Mr. Nonamaker omits any mention of it the following information may add to the history of zirconium.

Zirconium first became of commercial use when John Gordon discovered the monazite sands in Brazil and obtained a concession on same from the Brazilian Government. For some time the deposit was not worked, but finally the Welsbach Company of Germany discovered that there were elements in the monazite sand applicable to the manufacture of gas mantles and for years it purchased its entire supply from Mr. Gordon without revealing in any but a general way for what purpose it wanted the sand.

In 1916 Mr. Gordon was in receipt of an order for four shipments of sand "at his own price" from the German Government, and fearing that there might be a war use in this apparently harmless material he took the matter up with the British Government which, however, advised him that it knew of no reason why this should not be considered a neutral cargo and advised him to make shipment. Mr. Gordon, however, felt unconvinced and came to the United States and communicated with me as to my knowledge of the subject, inasmuch as I was an officer in the Chemical Warfare Service.

In February, 1918, Mr. Gordon came to Washington for the purpose of taking up the subject with the War Trade Board, Bureau of Imports, but received no information from it with reference to his inquiry.

It finally developed that the German Government desired to purchase this monazite sand for the purpose of extracting some of the other rare minerals—namely, cerium and thorium—the cerium being one of the important ingredients in the manufacture of flares and "star shells." On learning this the chemists of the chemical Warfare Service endeavored to separate the various minerals composing the monazite sand, but failed to do so to any extent, and Mr. Gordon then turned the problem over to commercial manufacturers of magnesium and other flares, who were immediately successful in their research and, I believe, were supplying the army and navy with flares containing these elements before the close of the war.

Inasmuch as John Gordon is known in South America as the "Monazite King" and inasmuch as he was the first person to make commercial quantities of zirconium available, any history of the uses of zirconium should, I feel, contain a reference to his name.

GODFREY M. S. TAIT.

Washington, D. C.

To the Editor of Chem. & Met.:

Sir—Having read the letter of Godfrey M. S. Tait relative to the first commercial use of zirconium, I should like to present the following aspect of the history of the Welsbach Company in America.

The Welsbach Company was established in the United States in 1887, having been founded, in common with the German and Austrian companies of the same name, upon the work of Dr. Karl Auer, who completed his work in the early years of the same decade and whose gas mantle was made from a mixture of zirconium oxide, lanthanum oxide and cerium oxide. The German and Austrian companies secured their raw material in the form of zircon from a Scandinavian source, while the American company bought, developed and exploited deposits of the same mineral in North and South Carolina. Not for several years later was developed the thorium-cerium mantle, at which time interest began to center around the development of commercial deposits of monazite, the only practicable source of thorium oxide.

It therefore follows that John Gordon, whose activities in the monazite field and consequently in that of zir-

conium minerals began only after the demand for thorium had been created, can claim no priority in the introduction of zirconium or its compounds to commercial use, since the Welsbach Company had been exploiting this mineral commercially for several years previous.

The Welsbach Company is entirely conversant with the holdings of monazite mentioned by Mr. Tait and with the activities of Mr. Gordon in this connection.

FREDERICK C. NONAMAKER.
Welsbach Co.,
Gloucester, N. J.

Ammonia Liquor Market

To the Editor of Chem. & Met.:

Sir—Your editorial in the Aug. 11 issue, p. 216, on "Ammonia Liquor Market Disappearing" starts with the prophecy that the synthetic ammonia process will drive out of the market the ammonia liquor hitherto supplied by the gas works and coke ovens. This conclusion seems to be in accordance with actual happenings, at least in the East, but I venture to prophesy that the conditions will only be temporary and that after a while the synthetic ammonia process will be driven out of this business.

In the past the gas companies have allowed the ammonia refiners to control the price and market the ammonia, and the arrangement has been profitable for both sides, but with the modern concentration of plants and employment of technical talent there is no reason why the gas works of medium capacity, say carbonizing 200 tons coal per day and up, should not do their own ammonia refining and convert their product to aqua ammonia that they can market themselves as such or can send to a central plant for conversion into anhydrous.

The place for making aqua ammonia is at the gas works, thereby saving in freight and doing in one operation what is now being done in two and utilizing the exhaust steam available at the works. And as the gas men will start with a raw material that costs them practically nothing, with a much smaller investment for apparatus and with labor costs for the larger plants less than in the synthetic ammonia process, I see no good reason why the gas men should let this profitable business slip away from them and why they should go into the less paying undertaking of making ammonium sulphate as you suggest in your editorial.

JOHN S. UNGER.
Chicago, Ill.

EDITORIAL NOTE:—Mr. Unger's suggestion should certainly have the consideration of such gas companies as can afford skilled technical control for the ammonia equipment proposed. It must not be forgotten, however, that the synthetic ammonia manufacturer expects to lose money during the development period and it is a hazardous project which assumes the burden of direct competition in the liquid ammonia field. No single system will care for all the cases, as was made clear in the original editorial; attention to all types of equipment is necessary.

Chloride of Lime Manufacture

To the Editor of Chem. & Met.:

Sir—I have read Mr. Brallier's criticism of my article describing a new system of chloride of lime manufacture in your Dec. 24, 1923, issue, p. 1141. Perhaps a numerical example will serve to clear up some of the misunderstanding that appears to exist. With the absorption of 1 kg. of chlorine 265 cal. is released. This will heat 27 cu.m. of a 20 per cent chlorine-air mixture 30 deg. C. Consequently for each kilogram of chlorine absorbed, the cooling system must reduce the temperature of 27 cu.m. of the gas mixture from 50 to 20 deg. C. No doubt can be placed on the possibility of transferring the heat of reaction to the moving gas in intimate contact with the chloride of lime.

If we assume an absorption tube of 2 sq.m. cross-section and a gas velocity therein of 1 m. per second, an absorption capacity of 266 kg. of chlorine or 760 kg. of chloride of lime per hour is obtained, equivalent to 18,240 kg. of chloride of lime per 24 hours. By taking into consideration the elimination of heat through the tube walls, a daily capacity of 20 tons is easily possible. The percentage of chlorine in the gas mixture will decrease only 1.5 per cent by volume from the tube inlet to the tube outlet. The percentage of chlorine in the circulating gas mixture will be higher in the case of an apparatus heavily loaded per unit volume than in one less heavily loaded.

With this apparatus the removal of heat of reaction is entirely automatic and Mr. Brallier will have to admit that the apparatus proposed is constructed on a new principle and that the heat problem is really solved.

Nothing stands in the way of lining the absorption tube and other large parts of the apparatus with stoneware plates; this material seems to be very suitable for the purpose.

I have not overlooked the possibility of scale formation or balling in the revolving tube, but I believe that this does not constitute any serious drawback, as similar difficulties have been overcome in other revolving tube processes.

DR. O. NYDEGGER.
Monstier s/S., Belgim.

Important Technical Articles In Current Literature

"Insulin and Its Manufacture." *Francis H. Carr.* Including a description of the adaptation of the original laboratory method of manufacture to large-scale production. A flow sheet is included. *Chemistry & Industry*, July 18, 1924, pp. 228-234.

"Marketing Sodium Nitrate." *Charles H. MacDowell.* How sodium nitrate is bought and sold, where it comes from and where it goes, the present market situation, and what may be expected in the future. *Engineering & Mining Journal-Press*, Aug. 2, 1924, pp. 173-174.

"Henry Ford's Cement Plant in Operation." *George M. Earnshaw.* Illustrated description of model 1000-bbl-per-day plant at River Rouge. *Rock Products*, Aug. 9, 1924, pp. 25-31.

"Modern Lime Plant That Makes Own Power." Description of plant of Gager Lime Co. at Sherwood, Tenn. *Rock Products*, Aug. 9, 1924, pp. 38-41.

"Pickling of Iron and Steel." *Victor S. Polansky.* A bibliography. The first of three articles on the available literature on this subject. *Forging-Stamping-Heat Treating*, July, 1924, pp. 267-269.

"The Preece Test for Zinc-Coated Materials." *W. M. Pierce.* Description of a recent investigation that showed the unreliability of this test as an indication of the weight of zinc coating. A stripping and weighing test is held to be the most reliable index of quality. *Iron Age*, July 24, 1924.

"Interchangeable Air System Reduces Operating Cost in Enameling Plant." Illustrated description of the new plant of the Vitrified Enamel Products Co. at Clyde, Ohio. *Ceramic Industry*, August, 1924, pp. 99-102.

"Rubber Latex as Paper Size." *J. Beekering Vinkers.* Laboratory tests show that the addition of latex to sulphite stock decreases tensile, increases folding and stretch, as well as the impenetrability to water. Rubber also tends to color the paper yellow, to render it transparent and sticky. *Paper Trade Journal*, Aug. 14, 1924, pp. 43-46.

In Current Foreign Literature

"Coagulation of Clay Sols; Permutation and Hydration." *R. Gallay.* A high calcium clay is more sensitive to coagulation by electrolytes than a K, Na or NH_4 clay. Differential hydration of particles in a sol is an important factor in coagulation. *Helv. Chim. Acta*, July, 1924, p. 641-3.

"Thermal Fractionation of Gaseous Products of Destructive Distillation of Organic Compounds." The gases given off by sugars, starch, casein, cellulose and other compounds give valuable information concerning the chemical nature of the original substances. *Comptes rendus*, June 30, 1924, pp. 2256-9.

Decomposition of Tetræthyl Lead and Its Use in Internal Combustion Engines." *Pierre Jolibois* and *George Normand.* Tetra-ethyl lead decomposes at about 400 deg., probably into ethylene and lead hydride, the latter then yielding Pb and H_2. This manner of decomposition probably accounts for its anti-knock properties. *Comptes rendus*, July 7, 1924, pp. 27-8.

"Critical Remarks on the Lignin Problem." *Karl Kuerschner.* A chief reason for the lack of clarity concerning lignin is that different investigators work with different preparations without specifying precisely their nature and history. *Chemiker-Ztg.* July 5, 1924, pp. 461-2.

"Temperature Limits in Technical and Scientific Work." *Ruff.* Thermal properties and upper working limits for the high melting elements and for various refractories. *Chemiker-Ztg.* July 8, 1924, p. 466.

News of the Industry

Summary of the Week

British Association for Advancement of Science features discussions of Canadian resources at recent Toronto meeting.

Procter & Gamble to appeal Federal Trade Commission ruling regarding sales practices in selling naphtha soap products.

Electrochemists at Detroit, Oct. 2 to 4, will feature round-table discussion on electric furnace cast iron.

Glen Lenardo Williams is discharged from Chemical Warfare Service.

Chemical Warfare Service and civilian chemists are asked to co-operate in attempts to devise effective boll weevil poisons.

Secretary of Agriculture issues regulations for enforcement of the naval stores act.

Uncertainty about available funds, arising from reclassification of salaries, delays Department of Commerce in appointing trade commissioners.

Production of acetate of lime and methanol declined sharply in June.

Sanitary Regulations Affect Fertilizer Industry

Drastic regulations governing the sanitary handling and control of hides, hair, bristles, wool, glue stock and other materials capable of introducing anthrax and foot-and-mouth disease have been issued by the Department of Agriculture. These regulations have an important bearing on the trade in fertilizers, since they make necessary various requirements that will add to the cost of bone meal, horn meal, meat meal, dried blood, tankage and manures.

There is no disposition on the part of the fertilizer interests to object to these regulations, as they are in thorough accord with the purpose of the restrictions. They have been given assurances by officials of the Bureau of Animal Industry that every effort will be made to relieve the trade in fertilizers of all unnecessary burdens.

The regulations require that no one of the materials mentioned may be admitted unless accompanied by certificate from a U. S. consular officer, showing that the material has been subjected to a minimum temperature of 155 deg. F. in the process of manufacturing, and to have been sacked in new bags, and have been carried to the seaboard in disinfected cars. If those conditions cannot be complied with, provision is made for disinfection after arrival in this country.

Since practically all of these imports will have to be disinfected after arrival, considerable quantities of saponified cresol solution, liquefied phenol and chloride of lime will be required for the disinfecting of cars, vehicles and premises that may be used. The commodities themselves must be disinfected with an improved chlorinating equipment or in the case of glue by heat, by assidulation or by soaking in milk of lime.

Japan Provides for Research in Chemical Warfare Service

Greatly increased interest in chemical warfare is being displayed by the Japanese. Additional appropriations just have been made available for research along the lines now being conducted by the Chemical Warfare Service of the U. S. Army. Colonel Hisamura, the head of the Chemical Warfare Branch of the Japanese Army, recently visited Edgewood Arsenal and expressed himself as greatly impressed with the painstaking way in which the Service is conducting its research.

Chemists Asked to Devise Boll Weevil Poisons

Since the entomologists have gone about as far as they can go in their work on boll weevil control until various chemical problems are solved, Congress has called in the Chemical Warfare Service and its specialists on poisons to co-operate in the effort to rid cotton of a pest responsible for annual destruction running into hundreds of millions of dollars. General Amos A. Fries, head of the Chemical Warfare Service, and H. W. Walker, of his chemical staff, just have returned from Georgia, where arrangements were perfected for the conduct of experiments in co-operation with the technical staff at the State Experiment Station. Immediately on return to Washington General Fries took steps to secure the assistance of civilian chemists in an attempt to devise more effective boll weevil poisons. He appealed to the officers of the American Chemical Society and to other leading chemists in the hope that they will assist in acquainting the chemists of the country with the technical details of the problems that must be solved.

This procedure was prompted by the results that followed a similar appeal made by General Fries several years ago in which he asked for ideas and suggestions from chemists generally as to the problems in connection with war gases. As a result of this request a large number of helpful suggestions have been received. In the matter of securing greater control of the boll weevil an opportunity is presented to do a great public service, General Fries points out. His hope is to get these problems before as many chemists as possible with the thought that they will turn them over in their minds.

In carrying forward the special experiments on gases and poisons which may be used effectively in the campaign against the weevil General Fries states that great care will be exercised to prevent any duplication of the work of the Bureau of Entomology. Due to the difficulties of reaching the weevil with contact poisons, General Fries is placing chief reliance on the use of gas, but extensive experiments are to be conducted with contact poisons in the hope of developing something more effective than calcium arsenate.

Chemical Division Moves Into Larger Quarters

Expanding activities on the part of the Chemical Division of the Department of Commerce have called for a greater amount of floor space. As a result, the division has been moved from its old quarters on the eighth floor of the Department of Commerce building to the fourth floor where 4 rooms, containing three times the amount of floor space occupied previously, have been assigned to the division.

British Association Discusses Canadian Resources

Toronto Meeting Largely Attended—More Than 300 Papers Presented—Lamb Elected President

THE 1924 meeting of the British Association for the Advancement of Science was held in Toronto Aug. 6 to 13 with hundreds of the world's foremost scientists in attendance. Apart from the organization meetings, more than 300 papers were read and many meetings were carried on simultaneously by the thirteen sections that included chemistry, mathematics, geology, zoology, geography, economics, engineering, anthropology, physiology, phychology, botany, agriculture and education.

At the opening ceremony Sir Robert Falconer, on behalf of the University of Toronto; Dr. Forbes Godfrey, Ontario Minister of Health, on behalf of the Ontario Government, and Prof. J. C. Fields, on behalf of the Royal Canadian Institute, each delivered a brief address of welcome to the association. Sir Ernest Rutherford, the retiring president, voiced the members' appreciation of the warmth of the welcome to the association.

The meetings of the Chemistry Section, which were well attended, opened with an address by Sir Robert Robertson, president of the section, who sketched the development of the main chemical activities of the state, and reviewed the conditions in Great Britain with regard to chemical research and endeavor.

Alkali-Chlorine Production

Following the president's address on the morning of Aug. 8, D. A. Prichard read a paper dealing with the Canadian Salt Co.'s processes for the manufacture of alkali-chlorine products. He stated that the company's plant at Windsor, Ont., was situated over salt deposits of vast extent, and that it was near enough Niagara Falls to render the use of electric power from that source economical. The first electrolytic alkali plant in Canada was installed in 1912 by this company. By the use of lantern slides Mr. Prichard gave details of the construction of the electrolytic cell used (Gibbs) and of its operation, efficiency, etc. He also gave details of the mechanical bleach-making equipment employed, which he believed to be the only successful one on this continent. A complete description of the manufacture and handling of liquid chlorine, in which industry the company is the pioneer in Canada, was also given.

A paper was read by R. L. Peek on "The Electro-Refining of Nickel" and was followed by a general discussion on Canadian electrochemical industries.

Liquid Fuels in Canada

On Aug. 12 there was an interesting paper by Dr. G. S. Hume on "Liquid Fuels in Canada." He stated that the production of oil in 1923 in Canada was obtained from wells in New Brunswick, Ontario and Alberta, but was only 1.3 per cent of the total consumption of crude and refined oils for the same time. Such a condition has greatly stimulated boring operations within the last few years, and tests of prospective fields have been made in many places, the most promising results being obtained in Alberta. However, even though a certain increase in production was possible from wells, the consumption was so far in excess of production that the probabilities of making Canada independent of foreign oil supply in the near future from this source alone were not very great.

Alberta's Tar Sands a Resource

Canada, however, possesses immense potential resources of oil in the tar sands of Alberta and the oil shales of the Maritime provinces. The oil shales of New Brunswick and Nova Scotia would, in places, produce as much as 30 to 36 imp. gal. of oil to the ton with some byproducts, and the amount of oil shales available is exceedingly large. For neither of these deposits, however, has a satisfactory commercial process of extraction been evolved up to the present, although the technical difficulties are being studied by experimental work and laboratory investigation, and it is hoped a solution will be discovered before long.

Co-ordinated research will develop the brown coals of the empire into a product of first importance commercially, according to W. A. Bone, professor of chemical technology at the Imperial College of Science, who read a paper on "Brown Coals and Lignites." These coals, which took a prominent place in Professor Bone's classification of the sub-bituminous fuels, are found in extensive deposits in the various colonies and dominions, he indicated, in throwing out the suggestion that research by chemists and engineers would make it possible to utilize many of these reserves, which are at present receiving little attention.

Progress in Use of Brown Coals

"Progress has been made in disposing of the difficulties that are in the way of using these fuels on a wide scale," said Professor Bone in describing experiments that have been made to improve them by drying, heat-treating, carbonizing, etc. He gave an interesting sketch of a boiler with appliances for drying lignite by waste flue gases from the boiler.

In offering to electrochemists the task of forming a substitute fuel, Prof. F. G. Donnan, of University College, London, declared that the time will come when coal or other forms of carbon will not supply the demands of the world for fuel. Fuel derived from salt deposits by the aid of electric power was the suggestion that he presented. According to his scheme, electric power would not be used directly but would be utilized where generating stations are near deposits of sodium chloride. The metallic sodium and the chlorine gas would be shipped and burned where the heat is required.

Prof. Horace Lamb, M.A., D.Sc., F.R.S., of Trinity College, Cambridge, was chosen president of the association for the year 1925, and Southampton, England, was selected as the place for next year's meeting.

Electrochemists at Detroit Will Feature Round-Table Discussion

The American Electrochemical Society through its Electrothermic Division has arranged to hold a round-table meeting and discussion of electric furnace cast iron on Thursday, Oct. 2, at the Hotel Tuller in Detroit, Mich. This is on the first day of the society's fall meeting, which is set for Oct. 2 to 4 in Detroit. All persons interested in electric furnaces or in cast iron or in the melting and treating of cast iron in electric furnaces, whether members of the society or not, are invited to attend this round-table meeting, which will be preceded by a luncheon.

As in the case of previous successful round-table meetings of this society, there will be no papers read, and the discussion will be kept as free, informal and intimate as possible. Since none of the proceedings or discussion will be printed in any form whatever, those who wish to benefit by the meeting will have to be present themselves or send representatives. George K. Elliott, of Cincinnati, Ohio, who is chairman of the society's Electrothermic Division, is making the arrangements for the round table and will serve as chairman of the meeting.

Mr. Elliott, who is one of the pioneers in the field of cast-iron electric-furnace metallurgy, announces that Dr. Richard Moldenke will be present and make the opening discussion, while others well known in the fields of cast iron and electric furnaces have announced their intention to be present. The aim is to have present electric furnace builders, electric furnace users and prospective users, metallurgists, iron foundrymen and representatives of central stations manufacturing the electric power.

Alpha Chi Sigma Men Plan Dinner at Ithaca

Alpha Chi Sigma men attending the fall meeting of the American Chemical Society at Ithaca will banquet at Risley Hall in the main dining room at 7:45 on the evening of Thursday, Sept. 11. Prof. Wilder D. Bancroft will act as toastmaster. Among the other speakers will be Sir Robert Robertson and F. G. Donnan, both of England, and Dr. Robert M. Burns, national president of the fraternity.

Tickets may be secured by members at the Alpha Chi Sigma registration desk of the convention or may be reserved in advance by communicating with A. W. Laubengayer, Baker Laboratory, Cornell University, Ithaca, N. Y.

In next week's issue of *Chem. & Met.* the details of arrangements made for the Ithaca meeting will be announced.

Washington News

Diversion of Alcohol for Illegitimate Purposes

Prohibition Unit Estimates Illegal Sales in 1924 Will Reach 5,000,000 Wine Gal.

No less than 5,000,000 wine gal. of industrial alcohol will be diverted for illegitimate purposes during 1924, it is estimated at the Prohibition Unit. Some means must be found, it is pointed out, to stop this enormous leak. Prohibition enforcement officers, it is explained, are particularly anxious to lay no obstacle in the path of the legitimate uses of alcohol, the importance of which they fully realize. Unless some effective steps are taken, the correspondent of *Chem. & Met.* was told at the Prohibition Unit, an adverse public opinion of formidable proportions will be built up which will force the adoption of new safeguards, likely to work hardships many times more severe than those of which the industry now complains.

The Prohibition Unit, it is stated, has no desire to put through any pre-conceived plans of its own if the industry can suggest a better way of meeting the situation. After the conference last week between the Commissioner of Internal Revenue and the advisory committee on trade alcohol it seems probable that some modification will be made in the proposal that permittees be required to sell alcohol only to those who will consent to furnish a list of customers at the request of prohibition agents. The industry contends that this is forcing permittees to do what the prohibition officials may not do legally. Judge Britt, the law officer of the Prohibition Unit, thinks there is no doubt as to the legality of the unit's original proposal. Officials of the unit, however, admit that legal authorities of high standing take an opposite view.

Want Industry to Help

Emphasis was placed on the point that prohibition officials are convinced that 95 per cent of those engaged in the distribution of industrial alcohol are entirely above any complicity in the diversion of alcohol for beverage purposes. They believe, however, that the industry can contribute more than it has in eliminating the crook, who is an enemy of the industry just as he is of those charged with the enforcement of the law. Some way must be found, it was asserted, to dispose of the "cover-up" houses. In some instances reputable businesses have been purchased for the sole purpose of making it easier to divert alcohol behind an established reputation. Attention was called to the fact that legitimate industry is suffering in another way from the operation of crooks. In order to cloak their operations more successfully they are dealing in standard articles. Such merchandise usually is sold at cost or even below, as any losses from those sales are readily absorbed by the large profits earned in the dispensing of supplies to bootleggers. The disruptive influence of this practice is becoming felt more and more. The experience of prohibition officers with those who pretend to be in legitimate business, when in fact their real activity is bootlegging, is such that they do not believe the moral suasion of permittees will have much influence on their customers who are not making honest disposition of alcohol.

The thought also was expressed that the alcohol industry cannot be suffering greatly from existing restrictions, as 1924 promises to be the most prosperous year since the peak of the war period. It is estimated that the 1924 production will exceed 70,000,000 wine gal. The flourishing condition of the industry is a matter of great satisfaction to prohibition officials, it was declared, and the hope was expressed that this may make it possible for the industry to do more to rid itself of the crooks which have fastened themselves upon it. Those interested in the manufacture and distribution of alcohol, it was said, should always keep in mind that "Uncle Sam lives on Main Street, and Main Street is dry."

Fieldner Is Active Abroad

After having spent 3 weeks in Belgium, northern France and Paris, A. C. Fieldner, the chemical engineer who is in charge of the Pittsburgh station of the Bureau of Mines, will continue his investigations abroad in conformity with the following schedule: Sept. 1 to Sept. 6, Montlucon, St. Etienne and southern France; Sept. 7 to Sept. 14, Geneva, Bern and Zurich; Sept. 15 to Sept. 20, Mannheim and Frankfort; Sept. 21 to Oct. 6, Essen, Cologne, Dortmund, Düsseldorf and Gelsenkirchen; Oct. 7 to Oct. 14, Berlin; Oct. 15 to Oct. 24, Holle, Dresden, Leipzig, Altenberge; Oct. 25 to Oct. 30, other points in Germany and several points in Holland; Nov. 1 to Nov. 14, Great Britain. Mr. Fieldner will sail for home on Nov. 15.

Appointment of Commissioners Contingent on Appropriations

The policy of the Department of Commerce with regard to trade commissioners has not been determined, largely because of the uncertainties arising from the reclassification of salaries. Until the exact effect of the increases provided in the reclassification act is known it is not possible to determine the amount that will be available for specialized work.

There is insistent demand from the chemical industry for specialized service in certain countries. While the plan that is regarded as most workable is the appointment of a chemical trade commissioner who would travel from country to country as did Dr. Breithut, an alternative has been suggested under which chemists could be stationed at two or three of the principal centers. Since the amount of money available would not permit of the employment of finished chemists for such duty, it has been suggested that valuable service could be performed by carefully chosen graduate chemists who would be willing to accept such a position at a nominal salary in return for the educational opportunity the work would afford. Their function would be largely a fact-finding one, but their entire time would be devoted to matters of interest to the chemical industry. In so far as the South American situation is concerned, however, it is believed it can be met only by the appointment of a chemical trade commissioner who would visit the principal countries. The same plan is being considered in connection with the department's work on non-ferrous metals.

Chemical Warfare Officers Take Educational Courses

To comply with War Department regulations in the matter of taking educational courses officers of the Chemical Warfare Service have been assigned as follows: Lieutenant-Colonel W. C. Baker, to Army Industrial College, Washington, D. C.; Major R. F. Mattox, to Army War College; Major A. Gibson, to General Staff School, Leavenworth; Major Owen Meredith, to General Staff School, Leavenworth; Major B. A. Brackenbury, to Infantry School, Fort Benning; Major J. W. Lyons, to Army Industrial College, Washington, D. C.; Lieutenant Harry A. Kuhn, to University of Wisconsin for special course in toxicology; Lieutenant Joseph F. Battley, to Harvard Graduate School of Business Administration; Lieutenant L. A. Elliot, to Harvard Graduate School of Business Administration for an additional year's instruction; Lieutenant Hubert B. Bramlet, to University of Illinois, for a special course in chemistry.

Ordnance Association to Stage Demonstration at Aberdeen

Chemical aspects of ordnance will be featured at the annual demonstration of the Army Ordnance Association at Aberdeen Proving Ground, Oct. 3. Particular attention is called to the Ordnance Department's accomplishments in developing a flashless powder and in improving other explosives. A smoke screen will be laid from a Martin bomber. Smoke bombs will be dropped from aircraft and smoke screens laid by tanks. In addition smoke curtains will be created by the use of smoke candles. Numerous ground types of pyrotechnics will be used. There will be extensive displays of cannon powders, small arms powder and of the higher explosives used in bombs and projectiles.

The program has been carefully prepared under the direction of General J. W. Joyes, in charge of the department's technical division.

News in Brief

Chlorine Tried for Animal Diseases.—The Chemical Warfare Service has had such success in the use of chlorine in combating the germs of influenza and colds that General Fries recently suggested to the Secretary of Agriculture that chlorine might be effective in combating foot-and-mouth disease. As a result of the suggestion the Bureau of Animal Industry has conducted a number of tests. No announcement has been made as yet of results.

Canada Seeks Australian Paper Market.—Canadian pulp and paper interests are looking for the conclusion in the near future of a trade agreement between Australia and Canada which will make it possible for the newsprint mills of the dominion to supply a share of the requirements of Australia. The present Australian import preference of $15 per ton to the English mills, or nearly 20 per cent ad valorem, is an almost prohibitive handicap, but the rejection by the British Parliament of the imperial preference proposals appears to have caused an attitude in Australia more favorable to a trade arrangement with Canada.

Northwest Magnesite May Make Caustic.—Reports are current that the Northwest Magnesite Co. is preparing to launch into the manufacture of caustic magnesite. Heretofore its output has been limited to the dead-burned product. Such action, it is pointed out, would have a far-reaching effect upon the industry in California. Some are of the opinion that many California properties would not be able to compete with the Northwest company.

Commercial Solvents Reopens Terre Haute Plant—The Commercial Solvents Corporation, New York, has resumed operations at one of its plants at Terre Haute, Ind., following a curtailment of several weeks. It is purposed to reopen the other plant of the company in this same section early in September, developing full production shortly thereafter.

Personnel of Foreign Silica Gel Corporation.—An announcement in the July 21 issue of *Chem. & Met.* (page 124) stated incorrectly the names of the board of directors of the Silica Gel Foreign Petroleum Corporation. The personnel of this board actually includes the following: J. B. August Kessler, William Caral de Leeuw, Fred Godber, C. Wilbur Miller, Waldo Newcomber, Robert Garrett, Omar Hershey and Ernest B. Miller.

Asbeston Industry Expands in Canada.—Two new asbestos mills are to be built by Asbestos Mills, Ltd., Montreal, to handle asbestos rock by the new selective treatment from the Black Lake and Asbestos Mines properties. G. L. Barland, consulting engineer, estimates the reasonably assured ore at the Asbestos Mines property at 2,000,000 tons, which will show a yield of $8,600,000 gross or of $3,960,000 net. The yield from three of the Black Lake properties he estimates at $51,700,000 gross or $23,370,000 net mining profit.

Manufacturing Chemists Organize Traffic Committee.—The traffic committee of the Manufacturing Chemists Association has been organized. John I. Tierney was elected chairman of the committee. It will hold bi-monthly meetings on the third Thursday of the month. At each meeting a different phase of the traffic problem concerning the separate branches of the industry will be considered.

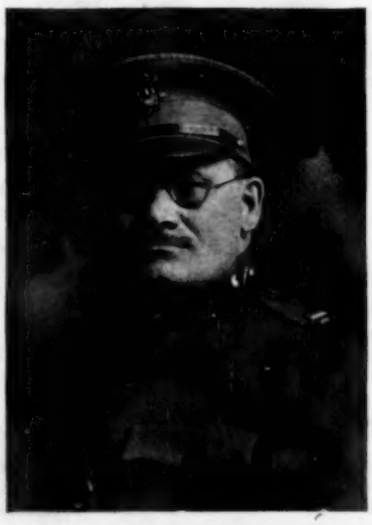
Iodized Salt to Be Marketed.—The Canadian Salt Co., Ltd., Windsor, Ont., has recently perfected and placed on the market a new product, iodized salt, which is designed to be a preventive of goitre. The Ontario Department of Health has sanctioned the use of the company's product and medical authorities predict that its use will greatly check the prevalence of goitre.

Canadian Porcelain Insulator Plant Built.—Smith & Stone, Ltd., Georgetown, Ont., has completed a plant for the manufacture of low-tension electrical porcelain. There are two factories in Canada making low-tension porcelain, but this company is the only one making insulating tubes for the trade. About 7,000,000 per year are made, while Canada uses about 25,000,000 tubes annually.

Williams Discharged from C.W.S.

Glen Lenardo Williams has been discharged from the Reserve Corps of the Chemical Warfare Service for the good of that Service. The revoking of Mr. Williams' commission as Lieutenant in this Service came partly as a result of recent disclosures regarding his promotion of unsound chemical engineering enterprises.

Mr. Williams has recently been featured in the Sunday supplements as being divorced, married and sued for breach of promise within 48 hours.



Glen Lenardo Williams

Elko, Nev., Honors Founder of Successful Oil-Shale Plant

Local organizations of business men in Elko, Nev., have announced plans for a 3-day celebration and street carnival, Sept. 18 to 20, which will include a complete demonstration of the commercial production of oil from shale. The event is staged in honor of R. M. Catlin, whose 100-ton plant in Elko is the first in this country to reach the stage of large-scale continuous operation. Elko is also a station of the recently organized air mail service and as an added attraction it is announced that Pilot Kenneth Unger's flying circus will provide entertaining stunts.

Although a special invitation has been sent to representatives of the oil industry, arrangements are being made to provide for a large crowd of non-technical visitors. Elko is 260 miles west of Salt Lake City, on the main line of two transcontinental railroads—the Western Pacific and the Southern Pacific.

Acetate of Lime and Methanol Outputs Decline in June

There was a sharp decline in the output of acetate of lime in June, according to reports received from manufacturers by the Department of Commerce. Production of methanol also fell off materially in that month. The following figures show comparisons for production, shipments, and stocks at the end of each month:

	Acetate of Lime (in Lb.)		
	Production	Shipments (or Use)	Stocks, End of Month
Jan.	13,420,193	9,022,250	23,401,511
Feb.	13,172,610	8,548,032	27,622,967
March	14,107,411	9,027,539	32,370,329
April	12,650,393	12,002,295	30,534,533
May	11,538,625	8,101,546	33,985,853
June	9,396,138	8,840,076	32,291,427

	Methanol (in Gal.)		
	Production	Shipments (or Use)	Stocks, End of Month
Jan.	705,747	642,812	2,632,633
Feb.	690,403	681,057	2,738,308
March	741,505	617,949	2,749,818
April	698,126	602,457	2,656,211
May	623,107	636,122	2,615,144
June	492,902	449,232	2,368,760

Riordon Bondholders Expected to Bid In Property

It is accepted in financial circles in Montreal as a fairly well-established fact that control of the Carillon power development rests in the hands of American interests closely identified with the Riordan pulp and paper situation. With the approach of the date upon which the latter company's assets will be sold at public auction interest in the possibilities involved in the situation is growing apace. It is now a generally accepted fact that the Riordan bondholders will "bid in" in the properties for their own account and protection, and that this step will be followed by the resale of at least a large portion of the Riordan holdings to the International Paper Co.

In view of the fact that control of Carillon power is believed to rest in these hands, it is thought that actual development of the site will be contingent upon the success of the Riordan plan.

Trade Notes

Plans have been ratified whereby the Standard Plate Glass Corporation of Pittsburgh will take over the Cincinnati Plate Glass Co.

The Ethyl Gasoline Corporation has been incorporated under the laws of Delaware. The new corporation is capitalized at $5,000,000 and will take over the promotion and sale of ethyl fluid, which has been handled by the General Motors Chemical Co.

The Commercial Solvents Corporation will re-open its second plant at Terre Haute, Sept. 10.

William I. Walker, who for many years was active in the management of the Church & Dwight Co., died at his summer home in New Canaan, Conn., on Aug. 18.

The Salesmen's Association of the American Chemical Industry will hold a golf tournament at the Westchester Hills Golf Club at White Plains, N. Y., on Tuesday, Sept. 9. There will be prizes and the usual good time is assured for all. The committee in charge of the tournament consists of John W. Boyer, chairman; Francis M. Fargo, and Wyley F. Tuttle.

Explosives manufactured and sold during June for use in the United States amounted to 446,117 kegs of black blasting powder, 3,714,264 lb. of permissible explosives and 22,194,328 lb. of other high explosives, according to information furnished by manufacturers to the Bureau of Mines.

To Vote on Gas Franchise in Detroit

Detroit is having a lively controversy over the question of standards to be required and the price to be charged for gas supplied by the Detroit City Gas Co. Some months ago a board of arbitration on the testimony of the city research engineer ordered a new price schedule and permitted the company to reduce the quality of gas from 600 B.t.u. per cubic foot to 530 B.t.u. per cubic foot. Subsequently one of the city newspapers and some of the city officials took up this matter with the National Bureau of Standards and the city research engineer's testimony was contradicted by the opinion of the bureau in almost every particular.

The bureau stated explicitly that unless the price for 530 B.t.u. gas could be at least 13 per cent lower than the price to customers for 600 B.t.u. gas there was no economic justification for lowering of the standard. They also stated that the 600 B.t.u. gas was, in the opinion of the bureau, at least 13 per cent more valuable per cubic foot than the lower heating value product. The city research engineer was discharged by the Mayor shortly after the bureau report was made public.

As a result of the controversy there is considerable feeling in Detroit and some doubt is expressed as to whether the necessary three-fifths majority can be obtained in approval of the franchise of the company when this is voted upon at the September election.

Procter & Gamble to Appeal Trade Commission Ruling

A ruling of considerable importance to the soap trade has been handed down by the Federal Trade Commission in ordering the Procter & Gamble Co., Cincinnati, Ohio, to discontinue the use of the word "naphtha" or its equivalent, in connection with the advertisement and sale of soap products that do not contain at least 1 per cent of naphtha.

In its investigation of the case the commission found that the respondents manufactured and sold soap products under the following names: "P & G The White Naphtha Soap," "Star Naptha Washing Powder" and "P & G The White Naphtha Soap Chips." None of these products, the findings state, contained an ingredient that could be identified as naphtha. In some instances kerosene in small and varying quantities was found.

The use of the word "naphtha" in connection with the above-named products, the commission found, is an unfair method of competition and a misrepresentation to and a deception upon the purchasing public. It is expected that the company will take an appeal.

Provisions for Enforcement of Naval Stores Act

Administrative regulations for the enforcement of the naval stores act have been promulgated by the Secretary of Agriculture. The regulations provide that a request for analysis for classification of any lot of naval stores must be in writing on a special form. The charge for examining turpentine is fixed at $2 for each sample, with 4c. per package additional for marking. The charge for classifying, grading and marking rosin is 10c. per package, with a minimum charge of $1. In addition to these fixed charges, whenever it is necessary for an inspector or rosin classifier to perform any travel in connection with such work, the cost of transportation and $4 a day for subsistence for the full time he is away from his headquarters must be paid by the applicant for his services.

From time to time the representatives of the Bureau of Chemistry will purchase samples of turpentine or of anything offered for sale as turpentine, for the purpose of analysis with the idea of detecting any violation of the act.

The regulations also cover directions for taking samples, the issuance of U. S. certificates, the labeling of turpentine and rosin which has been examined by the Bureau of Chemistry, the conduct of hearings and the care of duplicates of U. S. standards.

Charles E. Smith, naval stores inspector for the New York Produce Exchange, has been designated as the official classifier and grader at the Port of New York. His headquarters will be at Room 1301, 15 Moore St., New York. Samuel W. Ahlmann has been designated to serve as turpentine inspector at Cincinnati. His headquarters will be in the government building. Samples also will be analyzed and classified at the Bureau of Chemistry in Washington.

Financial

The Atlas Powder Co. has declared a dividend of $1 per share on the no par value common stock.

The Commercial Solvents Corporation has declared a dividend of $1 on the Class A shares on account of accumulated dividends. Regular quarterly dividends also were declared of $1 on Class A and 2 per cent on preferred stock.

For the year ended June 30, the Procter & Gamble Co. reports gross business of $121,372,682, compared with $109,776,389 in the previous year. Net income was $8,629,447 after depreciation, taxes, etc., against $8,552,825 in the preceding year.

The statement of United States Rubber Co. for 6 months ended June 30 shows net profit of $4,422,487, equivalent, after preferred dividends, to $2.04 a share earned on the outstanding common stock. This compares with $4,572,861, or $2.22 a share in the first half of 1923.

The Texas Co. has declared regular quarterly dividends of 75c. per share, payable Sept. 30.

Latest Quotations on Industrial Stocks

	Month Ago	This Week
Air Reduction	80⅞	80
Allied Chem. & Dye	76¼	74⅝
Allied Chem. & Dye pfd.	117¾	116
Am. Ag. Chem.	11⅛	14⅛
Am. Ag. Chem. pfd.	33⅜	39¼
American Cyanamid	*103	*101
Am. Drug Synd.	5	4⅜
Am. Linseed Co.	21	20⅞
Am. Linseed pfd.	41⅜	41
Am. Smelting & Refining Co.	69⅛	77⅛
Am. Smelting & Refining pfd.	102⅛	104⅛
Archer-Daniels Mid. Co. w.i.	21	21
Archer-Daniels Mid. Co. pfd.	84	*87
Atlas Powder	49¾	51
Casein Co. of Am.	66⅛	*67
Certain-Teed Products	25	28
Commercial Solvents "A"	62⅜	64⅞
Corn Products (new)	35⅛	32¾
Corn Products pfd.	*121	*122
Davison Chem.	57⅛	44⅜
Dow Chem. Co.	*50	*52
Du Pont de Nemours	127⅛	130⅛
Du Pont de Nemours db.	*88⅞	90
Freeport-Texas Sulphur	10	8⅜
Gold Dust	40	39
Grasselli Chem.	*125	*125
Grasselli Chem. pfd.	*102	*104
Hercules Powder	*95	95
Hercules Powder pfd.	*103⅛	103⅛
Heyden Chem.	1	2⅜
Int'l Ag. Chem. Co. (new)	6⅛	5⅜
Int'l Ag. Chem. pfd. (ctfs.)	38	*37
Int'l Nickel	18	18⅞
Int'l Nickel pfd.	85⅜	87
Int'l Salt	75⅛	75⅞
Mathieson Alkali	41⅜	40⅞
Merck & Co.	65	65
National Lead	146⅛	163
National Lead pfd.	114	117⅛
New Jersey Zinc	*143	163
Parke, Davis & Co.	*80	*80
Pennsylvania Salt	83	82⅛
Procter & Gamble	*130	*130
Sherwin-Williams	28⅞	29
Sherwin-Williams pfd.	*101	*101
Tenn. Copper & Chem.	7⅞	8⅞
Texas Gulf Sulphur	70⅜	78⅛
Union Carbide	59⅛	60⅜
United Drug	81⅛	83⅞
United Dyewood	39⅛	40
U. S. Industrial Alcohol	71⅜	75⅞
U. S. Industrial Alcohol pfd.	103	*103
Va.-Car. Chem. Co.	1⅞	1⅞
Va.-Car. Chem. pfd.	5⅛	5⅛

*Nominal. Other quotations based on last sale.

Men You Should Know About

E. H. BERGER, chemist in the paint section of the Bureau of Standards, resigned on Aug. 1 to take a position with the Johns-Manville Co. Mr. Berger has been engaged for a considerable number of years on the study of bituminous materials for roofing, waterproofing, paints, etc., and will continue work in this general field in his new position.

ALFRED V. DU PONT, manager of the plant of the du Pont Powder Works at Louviers, Colo., was married at Littleton, Colo., on Aug. 8, to Miss Mariolla Miller. The couple will make their home at Louviers. Mr. du Pont is a graduate in chemical engineering, Yale University, and a son of Alfred I. du Pont.

JAMES B. FRIAUF, Missoula, Mont., has been appointed a member of the bureau of metallurgical research, Carnegie Institute of Technology, Pittsburgh, Pa. Dr. FRANCIS M. WALTERS, JR., has recently received an appointment as director of the new bureau at the institution, and DR. V. N. KRIVOBOK as assistant director.

A. F. GREAVES-WALKER, ceramic engineer, vice-president and director of the Stevens Bros. Co., Stevens Pottery, Ga., has been appointed director of the new department of ceramic engineering to be established at the North Carolina State College during the coming school year. The appointment carries a full professorship. Mr. Walker will continue his connection with the Stevens company, and will engage also as a consulting ceramic engineer for outside practice. He was president of the American Ceramic Society last year.

C. J. GUNDLACH, president of the Mississippi Glass Co., New York, now abroad on a pleasure trip accompanied by his family, will sail for the United States on Aug. 29.

ALLAN A. JOHNSON has been elected vice-president of the Eagan-Rogers Steel & Iron Co., Crum Lynne, Pa., manufacturer of steel castings, etc., with headquarters at the company plant.

GEORGE G. KAESTNER has been appointed sales manager for Canadian ndustrial Alcohol Co., Ltd. He has been in charge of the development department and marketing of the denatured alcohol and has also been in close touch with the sale of industrial alcohols.

A. W. LANDSTROM has joined the staff of the Washburn-Crosby Co. and after Oct. 1 will be in charge of sales promotion work in the Chicago office.

NELSON LITTELL, for several years an examiner in the Metallurgical and Chemical Division of the Patent Office, has recently become a member of the firm of Hammond & Littell, patent lawyers, 110 East 42nd St., New York.

R. E. MCCABE, heretofore petroleum engineer for the California State Department of Petroleum and Gas, has been appointed deputy supervisor for the department for District No. 3, with headquarters at Santa Maria, Calif.

Dr. J. E. MILLS has been appointed chief chemist in charge of the research work of the Chemical Warfare Service. Dr. Mills went into war service from teaching work in South Carolina and has had more field experience in chemical warfare than almost any other chemist in the country. Since the war period he has been connected with the Chemical Warfare Service in various capacities, serving for several years as the chief co-ordinator at Edgewood Arsenal, working with the research, the mechanical and the military branches of the service. Dr. Mills has already assumed his new position at Edgewood Arsenal.

Prof. CHARLES E. MUNROE, chairman of the committee on explosives investigations of the National Research Council and professor emeritus of chemistry at George Washington, University, has been elected to honorary fellowship in the American Institute of Chemists, in recognition of his attainments in chemistry. This is the second time that this honor has been conferred on an American chemist, the first recipient being Prof. C. F. Chandler of Columbia.

P. E. PALMER, chemist of the gas section of the National Bureau of Standards, has resigned to take up teaching work in the high school and junior college of Brawley, Calif. Mr. Palmer has already left Washington for the West.

GEORGE B. PEGRAM, dean, Faculty of Applied Science, Columbia University, New York, has returned from a trip to a number of leading universities for inspection of their chemical laboratories and facilities, to secure suggestions for the proposed new laboratories to be erected at Columbia at a cost approximating $875,000.

Calendar

AMERICAN CERAMIC SOCIETY, Los Angeles, Calif., Oct. 6 to 7.

AMERICAN CHEMICAL SOCIETY, sixty-eighth meeting, Cornell University, Ithaca, N. Y., Sept. 8 to 13.

AMERICAN ELECTROCHEMICAL SOCIETY, Detroit, Oct. 2 to 4.

AMERICAN FOUNDRYMEN'S ASSOCIATION, Milwaukee, Wis., Oct. 11 to 16, 1924.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, Pasadena, Calif., Oct. 13 to 17.

AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS, Birmingham, Ala., Oct. 13 to 15.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, New York, Dec. 1 to 4.

AMERICAN SOCIETY OF REFRIGERATING ENGINEERS, New York, Dec. 1 to 3.

AMERICAN SOCIETY FOR STEEL TREATING, Boston, Sept. 22 to 26.

FRANKLIN INSTITUTE CENTENNIAL, Philadelphia, Sept. 17 to 19.

MANAGEMENT WEEK. Auspices of American Society of Mechanical Engineers, New York City, Oct. 20 to 25.

NATIONAL SAFETY COUNCIL, Louisville, Ky., Sept. 29 to Oct. 3.

PACIFIC COAST GAS ASSOCIATION, Santa Barbara, Calif., Sept. 15 to 19.

W. A. SLATER, who has been on leave of absence from the Bureau of Standards, is returning to the cement section on Sept. 1. He will resume work there on cement and concrete utilization in the structural engineering field.

ALFRED TAYLOR, president of the Combustion Engineering Corporation, Toronto, has been named to make an extensive survey of the pulp and paper industry of Sweden and Finland, with special reference to the use of steam.

CHARLES B. WARREN has been re-elected president of the Michigan Sugar Co., Saginaw, Mich.

JAMES E. WHALLON, Indianapolis, Ind., now entering his senior year in the school of chemical engineering, Purdue University, is the recipient of the Hoffman scholarship awarded by the Chemists Club, New York, for excellence in the study of chemistry. A year ago Mr. Whallon received the Wilbur scholarship from Purdue University.

FREDERICK W. ZONS has been appointed to head the engineering staff of the General American Radio Corporation as consulting chemical engineer.

Obituary

Sir GEORGE BEILBY, F.R.S., died Aug. 1 at his home, Hampstead, London, England. He was born in Edinburgh in 1850, was educated at Edinburgh University and from 1869 until early in the war was engaged in technical industries, notably the Scottish shale oil industry, the Castner Kellner Co. and the Cassel Cyanide Co. As far back as 1910 he was engaged in experimenting at the Maryhill works of the latter company on carbonizing coal at 400 to 500 deg. C. and on briquetting the coke. During the war he was a member of Lord Fisher's Board of Inventions, the Trench Warfare Committee, the Privy Council's Committee for Scientific and Industrial Research and later chairman and director of the Fuel Research Board. Knighted in 1916, he was a Doctor of Laws of Glasgow and Birmingham, a Doctor of Science of Durham, a past president of the Society of Chemical Industry, of the chemical section of the British Association, of the Institute of Chemistry and of the Institute of Metals.

FRANK M. BREEN, prominent in the petroleum industry in the mid-continent field, Okla., died at the Memorial Hospital, New York City, Aug. 12, aged 52 years. He was president of the Osage Oil & Gas Lessees Association, and vice-president of the Mid-Continent Oil & Gas Association. He was born at Franklin, Pa.

CALEB E. JOHNSON, president of the Palmolive Co., Milwaukee, Wis., manufacturer of soaps, died at the home of his daughter at Easthampton, L. I., Aug. 9, aged 67 years. He is survived by his wife and two daughters. Mr. Johnson resided at Orange Park, Fla.

Sir EDMUND B. OSLER, director of the Imperial Oil, Ltd., and the International Petroleum Co., died at his home in Toronto, Aug. 4, in his seventy-ninth year.

Market Conditions

Small Lot Buying of Chemicals and Allied Products Gains in Volume

More Inquiry Reported Also for Contract Commitments—Market Prices Are Working Into Firmer Position

WITH large consuming industries becoming more active, call for raw materials is awakening and different sellers are authority for the statement that buying of small lots for prompt delivery has increased. Reports from tanning and textile centers have indicated material improvement in those lines and have added to the belief that raw materials will come in for more attention. The markets, therefore, have been aided not only by a gain in orders placed but also by a greater confidence on the part of sellers which has tended to remove pressure and to stabilize values.

Interest in contract commitments, likewise, has been more in evidence. This is illustrated by reports that textile interests have been asking for quotations on dyes covering deliveries over the latter part of the year. Sales of various chemicals over distant periods also are reported. Sellers of bichromates have been able to book round lot orders and alkalis are said to have met with considerable inquiry. Soap-making materials have been selling rather freely and large lots have been involved.

The weighted index number for the week was again higher, resting at 166.45 as compared with 165.78 for the previous week. The lowest price levels for the year to date were recorded in the closing week of May when the index number stood at 151.26. Since then the price trend has been upward and present indications bear out the contention that selling pressure has given way to a more normal working of the law of supply and demand with the probable trend to still higher levels.

A review of reports from the cotton-growing sections leaves the impression that boll weevil damage is considerably less than it was a year ago. This may offer some explanation for the disappointing buying movement in calcium arsenate. At any rate the demoralized state of the arsenate trade is one of the features of the present market.

Acids

Consumers of citric acid have not been operating heavily and holders of spot supplies have been competing rather keenly to effect sales. Buyers were able to do 45½c. per lb. which brought imported acid below the price asked for domestic. Tartaric acid also has moved in a limited way with the active season pretty well over. Prices are quotably unchanged but the quiet conditions have favored buyers. Oxalic acid has varied in price according to seller and quantity and this condition still obtains. Imported acid is offered freely and some sellers of domestic are willing to meet competitive prices. A general firmness has been noted in the wood distillation products and the steadier tone to acetate of lime is said to have been reflected in the market for acetic acid. Scattered buying of formic acid is reported with very little fluctuation in asking prices.

In the mineral acid group, nitric has been steadied somewhat by firmness in raw materials and there has been less disposition to press sales at private terms. Sulphuric acid has shown but little change but sellers are hopeful of an active call in the near future and this has reduced selling pressure in some quarters.

Caustic Potash Sells at Higher Price — Carbonate and Sulphate of Lead Advanced—Sulphate of Ammonia in Limited Supply — Nitrite of Soda Firmer—Arsenic Holds Easy Position — Barium Chloride Lower on Spot—Tin Oxide Higher in Price—Calcium Arsenate Under Selling Pressure

Potashes

Bichromate of Potash—With a gradual improvement in the leather trade, the outlook for bichromate is brighter but the current market has been far from satisfactory. In the first place buying has not been consistent and secondly prices have been irregular. Prices have been influenced more by eagerness of sellers to obtain orders than by producing costs. Nominally the asking price is 9c. per lb. but this can be shaded on actual business.

Carbonate of Potash — Demand has been limited to immediate needs. Spot offerings have been free and the price tone was easy. Calcined 80-85 per cent was offered at 5¼@5½c. per lb.; 96-98 per cent at 5¾@6c. per lb.; and hydrated 80-85 per cent at 5½@5¾c. per lb.

Caustic Potash—Cables from foreign markets were higher and with spot holdings reduced by recent buying, the market was firmer in all positions. Sales of spot goods were made at 6¾c. per lb. and in the latter part of the week this was given as an inside price. Shipments from abroad also were held at 6¾c. per lb.

Chlorate of Potash—Consumption is reported to be along normal lines but the spot market remains quiet due to the fact that consumers are well covered ahead. A large part of arrivals from abroad are sold ahead and only scattered inquiry is reported for additional lots. Spot offerings are held at 6¾@7c. per lb.

Permanganate of Potash — Sellers were in a more receptive mood during the past week and sales were made as low as 13½c. per lb. The latter is not an open price as sellers quote 13¾@14c. per lb. but occasionally will accept bids at the 13½c. per lb. level.

Prussiate of Potash—Red prussiate is still inactive but asking prices are not being lowered and 37½@38c. per lb. represent sellers' views. Yellow prussiate while quoted at 18c. per lb. on spot is held at 18½c. per lb. in some quarters. Shipment prices for the latter are 17½@17½c. per lb.

Sodas

Bichromate of Soda — Inquiry for bichromate has been stimulated because of improvement in consuming industries. This has been aided by initiative on the part of sellers who are reported to have quoted low prices in order to secure business. Various prices are heard regarding the figures at which sales have been made but they agree in stating that the market has been unsettled. The open quotations are 6¾@7c. per lb.

Caustic Soda—Buying for export was again reported as light. Prices on a f.a.s. basis have undergone no change but are distinguished according to brand, seller, and point of destination. Quotations are 2.80@3c. per lb. Call from domestic consumers is fairly steady and there have been reports of sales for later deliveries on private terms. The contract price is still quoted at 3.10c. per lb., carlots, f.o.b. works.

Nitrite of Soda—Considerable interest has arisen regarding future prices for nitrite. Importers apparently are not willing to absorb the increase of duty and are holding prices on a firm level. In fact offerings at 8½c. per lb. which were on the market a short time ago have been withdrawn and 8¾c. per lb. is now asked for German material and Norwegian is reported to be in a nominal position. Offerings of domestic nitrite are not heavy and there

is some doubt regarding the extent to which domestic producers will operate.

Nitrate of Soda—The question of tariff as referred to refined nitrate of soda has not been settled and this uncertainty is one of the present features of the market. A report from Washington says that an increase of 6.7 per cent in production of nitrates is predicted by British interests controlling the Chilean nitrate beds, for the year ending June 30, 1925, as compared with the year ended June 30, 1924, when production reached 2,186,000 tons, and 41.3 per cent increase over the 877,000 tons of the preceding twelve months. In the present production year they forecast 2,350,000 tons. Present price for spot nitrate is $2.50 per 100 lb.

Prussiate of Soda—The spot market has been irregular. In most quarters 9½c. per lb. is an inside price but sales are said to have been made at 9⅜c. per lb. Shipments are offered at the latter figure.

Miscellaneous Chemicals

Acetate of Lime — Production of acetate of lime in June was lower than in any preceding month of the year. Production for the first 6 months of the year was 74,285,370 lb. which compares with 87,109,970 lb. in the corresponding period of last year. Shipments from producing points in the 6 month period were 55,541,738 lb. as compared with 93,189,420 lb. in the first half of 1923. While the statistical position has been none too favorable this material in conjunction with other wood distillation products is reported to have improved its status in recent weeks and prices are steadily quoted at $3 per 100 lb.

Arsenic—Demand for spot arsenic has failed to hold up and with the probability of a recovery in values remote, holders of stocks have shown more readiness to unload. Imported arsenic is quoted at 7⅜@7½c. per lb. with the tone unsteady and bids under the quoted price would probably find sellers. Domestic arsenic in round lots is offered at 7½c. per lb. for prompt and forward. Calcium arsenate is reported to be offered at low prices at Southern points and the market has been tending to lower rather than to higher levels. Reports of boll weevil damage are less frequent than a year ago and there is not the incentive in some sections of the South to increase the use of arsenate.

Barium Chloride—Offerings of imported material were more free and quiet call from consumers resulted in lower asking prices. Spot goods were openly quoted at $75 per ton and some importers were calling for bids in order to move goods from docks without transferring to warehouse. Barium carbonate was unchanged at $59 per ton on spot.

Copper Sulphate — While no active buying is reported, the market has held a steady course and producers are inclined to follow the rise in the metal and to quote a firm market for the sulphate. Asking prices for domestic material range from 4½c. to 4⅝c. per lb., according to seller and grade. Some offerings of imported sulphate were on the market at 4⅜c. per lb.

Formaldehyde — Firmness is still noted in this market. Competition is said to have forced values down to a low level and the quotation remains at 9c. per lb., but there is an upward range according to quantity and any price change is regarded as favoring advances.

Tin Oxide — Owing to the higher prices reached by the metal, a higher sales schedule for the oxide went into effect at the beginning of the preceding week. The revised price showed an advance of 3c. per lb. and brought the asking price to 55c. per lb. No change was made in selling prices for bichloride of tin or tin crystals.

"Chem. & Met." Weighted Index of Chemical Prices

Base = 100 for 1913-14

This week	166.45
Last week	165.78
Aug., 1923	168.00
Aug., 1922	152.00
Aug., 1921	158.00
Aug., 1920	264.00
Aug., 1919	251.00
Aug., 1918	278.00

The weighted index number advanced 67 points on higher prices for glycerine, metal salts and crude cottonseed oil.

Alcohol

Demand for denatured alcohol was good and, with a strong situation in raw materials, the undertone remained firm in all quarters. Special formula No. 1 closed the week at 46c. per gal., in drums, carload lots. Completely denatured, formula No. 5, held at 45c. per gal., in drums.

Production of methanol in June amounted to 492,902 gal., which compares with 623,107 gal. in May. Stocks of methanol on the last day of June were estimated at 2,368,760 gal., against a total of 2,615,144 gal. the month preceding. The market was quotably unchanged, with the undertone slightly firmer. Pure, in tank cars, held at 75c. per gal., f.o.b. point of shipment.

Coal-Tar Products

Byproduct Coke Output in July 25 Per Cent Below Average for 1923 —Benzene Offerings Limited—Prices Firm

ACCORDING to the Geological Survey the production of byproduct coke in July amounted to 2,352,000 tons, which compares with 2,416,000 tons in June and 2,798,000 tons in May. The present monthly rate of production at byproduct plants is 25 per cent below the average for 1923, and reflects curtailment of activity at iron and steel plants. July production was the lowest level reached since early 1922 and was 62.6 per cent of capacity. The report states that 2 new plants began operations in the spring, bringing the total number to 73. Of the total output of byproduct coke 80.7 per cent was produced at plants affiliated with companies operating iron and steel plants. Price changes in the market for byproducts were few and rather unimportant. Benzene was firm on small holdings. Demand for phenol was inactive, but no selling pressure was apparent.

Aniline Oil and Salt—With consuming industries showing a general revival of buying interest the market for aniline oil took on a better undertone. Leading producers reported business on the former basis of 16c. per lb., drums extra, carload lots. Aniline salt was nominally unchanged at 21@23c. per lb., according to quantity and seller.

Benzene—Producers reported an unchanged market, despite the firmer feeling which prevailed for nearby material. There has been little change in the supply situation, production being well below the mark set last year. Offerings of 90 per cent and pure benzene continue small. Prices were repeated on the tank car basis of 23c. per gal. for the 90 per cent grade, and 25c. per gal. on the pure, f.o.b. point of production.

Naphthalene — Demand for refined naphthalene was slow, but buying interest was in evidence in the grades usually absorbed by intermediate makers. Prices on white flake were merely nominal at 4¾@5¼c. per lb. Chips were available at 4¼@4½c. per lb., carload basis. Crude to import, good quality, held around 2c. per lb., c.i.f. basis.

Ortho-toluidine — There was slight improvement in demand and sellers have firmed up in their views. Quotations range from 14@16c. per lb., an advance of 1c.

Phenol—The call for U.S.P. phenol was rather slow, but sellers were not forcing matters and prices held. Prompt shipment material was available at 24@25c. per lb., in drums, the inside figure obtaining on round lots. On futures prices were nominal, but producers did not care to quote under 24c. per lb.

Pyridine—Offerings on spot limited and this tends to support prices at $3.90@$4 per gal. Foreign markets steady.

Solvent Naphtha—Stocks were small, due to the restricted output. First hands maintained prices on the basis of 25c. per gal. for the water white, tank cars, f.o.b. works. Demand was described as fair.

Xylene—Demand for all grades was inactive and prices in some quarters were unsettled, especially on the commercial variety. Leading factors quoted 28c. per gal. on the commercial, tank cars, f.o.b. point of production, but others were in a position to name 26c. on this kind of business. On the 5-degree grade 40c. was asked, tanks, works.

Vegetable Oils and Fats

Spot Cottonseed Oil Strong; Futures Irregular—Linseed Oil Steady—Active Trade in Sesame Oil—Tallow Advances

THERE was a firm market for all edible oils for prompt and nearby delivery, with business good. The distribution of refined cottonseed oil in July was larger than expected, notwithstanding high prices. Traders reported active business in substitute oils, chiefly imported sesame oil. The past week witnessed several days of fair buying of nearby linseed oil, but futures remained quiet.

Cottonseed Oil—The feature was the monthly statement on cottonseed products, indicating disappearance of 229,500 bbl. of oil during the month of July. Private estimates on July consumption ranged from 175,000 to 200,000 bbl., so the actual figures came as a surprise to the trade. The visible supply of 288,000 bbl. on July 31 is 77,000 bbl. smaller than a year ago. Owing to unsettlement in pure lard, due to profit taking, the report exerted little influence upon the market. In the option market on the Produce Exchange September was the active month, this position closing on Thursday at 13.47c. bid and 13.50c. asked, which compares with 13.52c. bid and 13.55c. asked a week ago. December prime summer yellow oil settled at 10.74c. bid and 10.75c. asked, which compares with 10.92c. bid and 10.94c. asked a week ago. Spot refined oil was nominal at 15c. per lb. Crude oil was traded in at 11.90c. per lb., tank cars, Texas, while in the Southeast 12c. was bid and turned down. Offerings of new crop crude were comparatively small. Bleachable oil was nominal at 13½c. per lb., tank cars, Texas common points. Lard compound was firm at 16@16½c. per lb., carload basis, New York. Pure lard, cash, in Chicago, was offered at 13.65c. per lb.

Linseed Oil—Weather conditions in the Northwest and Canada were not so good and this caused prices for flaxseed to hold rather firm. The strength in seed supported the market for oil and prices named on nearby deliveries were about 2c. per gal. higher. Just before the advance became general some sellers booked a fair amount of business, most of the buying taking place in September and October contracts. Toward the close trading was quiet. Early September delivery settled at $1.02 per gal., with second-half of September at $1 per gal. October closed nominally at 95@96c. per gal., with November-April at 90@91c. per gal., carload lots, cooperage included. Stocks of oil on spot are small and several crushers refused to take on new business. Further activity was reported in foreign oil for shipment to this country in bulk. Arrivals of new crop seed in the American Northwest have been comparatively small, while the demand has been brisk. Cash seed at Duluth closed nominally at $2.70 per bu., with September available in the option market at $2.40 and October at $2.30¾. At Buenos Aires the market ruled steady on good buying for the Continent. In the South American market the September option settled at $2.01¼ per bu. Cake for export was firm at $44@$45 per ton, f.a.s. New York.

China Wood Oil — Offerings of prompt shipment oil were moderate, both here and on the Pacific coast, and prices steadied. Inquiry was fair. On the coast 13c. was asked for prompt oil, tank cars, while this price also obtained on September deliveries. October shipment from the coast was offered at 12¾c. per lb., with November-December at 12½c. In New York 14½@15c. per lb. was asked for oil in cooperage, the price depending upon the seller.

Heavy Disappearance of Cottonseed Oil in July

Distribution of cottonseed oil in July amounted to 229,500 bbl., which compares with 153,000 bbl. in June and 166,000 bbl. in July a year ago. The visible supply at the close of the crop year was placed at 288,000 bbl., which compares with 365,000 bbl. a year ago. Crop year statistics on cottonseed and cottonseed products, with a comparison, follow:

	August-July 1923–24	August-July 1922–23
Seed received, ton	3,320,648	3,245,807
Seed crushed, ton	3,304,454	3,241,557
Crude oil mfd., lb.	978,992,377	1,002,922,464
Ref'd oil mfd., lb.	862,333,994	910,939,168
Cake & meal prod., ton	1,515,918	1,487,067
Stocks July 31:		
Seed at plants, ton	21,534	12,786
Crude oil, lb.	4,057,676	5,103,348
Ref'd oil, lb.	105,946,576	138,112,489
Exports 12 months:		
Crude oil, lb.	24,512,813	25,752,300
Refined oil, lb.	15,051,584	38,717,986
Cake & meal, ton	124,940	226,583

Corn Oil—Crude corn oil sold at 12¼c. per lb., tank cars, August shipment from Chicago. The stocks were light and the undertone fairly steady. Late in the week 12c. was bid, tank cars, f.o.b. point of production in the Middle West.

Coconut Oil—Scattered business in Ceylon type oil for immediate delivery took place at 9¾c. per lb., tank cars, f.o.b. New York. On the Pacific coast 9⅝c. was asked for nearby oil, while October forward was nominal at 9¼c. per lb., tank car basis.

Palm Oils—Some sellers raised shipment prices on higher cables from Liverpool. Lagos oil for forward delivery closed at 8.30@8.50c. per lb., according to seller. Niger for shipment was offered during the week at 7.90@8.12½c. per lb., c.i.f. terms.

Palm Kernel Oil — Inquiry was in evidence. English oil for shipment was raised to 9⅞c. per lb.

Rapeseed Oil—Refined oil on spot sold at 88c. per gal. A round lot sold for October-December shipment from abroad at close to 86c. per gal.

Sesame Oil — Demand was active, spot refined oil on spot bringing from 14@14½c. per lb. Oil now afloat was offered at 13¾c., with October forward nominal at 12½c. per lb.

Sunflower Seed Oil—Refined oil on spot sold at 12¼c. per lb. Crude was nominal at 11c. per lb., forward delivery.

Soya Bean Oil—Offerings scanty and market wholly nominal. September-October shipment from the Pacific coast held at 10¼@10½c. per lb., tank cars, duty paid.

Fish Oils — Fishing for menhaden along the Atlantic coast has been disappointing and with the inquiry for crude oil good prices ruled firm. Last sales of crude menhaden oil went through at 50c. per gal., tank cars, factory. Newfoundland cod oil, crude, was offered for forward delivery at 55c. per gal., ex dock New York.

Tallow, Etc.—Soap makers took on fairly liberal quantities of extra tallow at 8¼c. per lb., f.o.b. melters' plant. Later a parcel of 60 drums sold at 8¼c. per lb. The market was firm, but large buyers would not bid higher than 8¼c. Yellow grease, good quality, closed at 7⅞@8c. per lb. Oleo stearine sold at 16¾@17c. per lb. Red oil was advanced to 9¼@9½c. per lb.

Miscellaneous Materials

Antimony—Demand has improved. It was reported that floods in China have interfered with production. Chinese brands on spot 10¼@10½c. per lb. Cookson's "C" grade 12½c. per lb. Chinese needle lump nominal at 8½@9c. per lb. White oxide, Chinese, 99 per cent, 11@11½c. per lb.

Glycerine—Dynamite was offered at 17⅛@17¾c. per lb., carload lots, f.o.b. point of production, the inside figure obtaining in the Middle West. Chemically pure on spot firm at 18¼@18½c. per lb., in drums, less than carload lots. Offerings of crude were scanty. Soap lye crude, basis 80 per cent, nominal at 12c. per lb., loose, f.o.b. point of production. Saponification, basis 88 per cent, nominal at 13¼c. per lb., loose.

Lithopone — Demand moderate only and competition for new contracts keen. Prices were nominally unchanged, ranging from 6¼@6¾c. per lb., the inside figure obtaining on round lots.

White Lead — Corroders advanced prices for white lead, dry and in oil, ¼c. per lb., effective Aug. 19. The uplift was brought on by the advance in the metal. Pig lead was raised to 8c. per lb. by leading producers, a net gain of ¼c. for the week, with little available for nearby delivery. White lead, basic carbonate, dry, closed at 10c. per lb., and the basic sulphate at 9½c. per lb. Sublimed blue lead closed at 9½c. per lb. Demand was good. There were no additional price changes in red lead, litharge or orange mineral.

Zinc Oxide — Moderately higher prices prevailed for zinc, which steadied the market for oxide, but resulted in no change in the selling schedule. Business has improved slightly, rubber manufacturers showing more interest. American process, lead free, closed at 7⅞c. per lb., carload basis. French process, red seal, offered at 9⅝c. per lb.

Imports at the Port of New York

August 15 to August 21

ACIDS—Chromic—5 dr. Hamburg, Metals & Thermit Corp. **Formic**—150 pkg., Hamburg, International Acceptance Bank. **Oxalic**—28 bbl., Hamburg, Order. **Stearic**—63 bg. Rotterdam, Ponds Extract Co. **Tartaric**—200 bbl., Bari Superfos Co.; 72 kegs, Rotterdam, W. Benckert.

ALBUMEN—106 cs., Shanghai, J. Lowe & Co.; 58 cs., Shanghai, Stein, Hall & Co.; 168 cs., Shanghai, French, Kreme Co.; 23 cs., Shanghai, French-Am. Banking Corp.; 61 cs., Shanghai, D. L. Moss & Co.; 26 cs., Shanghai, Balfour, Williamson & Co.; 32 cs., Shanghai, Mechanics & Metals National Bank; 67 cs., Shanghai, Order; 15 bbl. Trieste, Farmers Loan & Trust Co.

AMMONIUM NITRATE—186 csk., Hamburg, Order.

AMMONIUM CARBONATE — 10 csk., Liverpool, Order.

ANTIMONY—30 csk., Havre, American Express Co.; 26 csk., London, S. Fullwood.

ANTIMONY SULPHIDE—15 csk., London, S. Fullwood; 7 csk., London, L. H. Butcher Co.

ARSENIC—180 bbl., Tampico, American Metal Co.; 700 cs. (at San Francisco), from Kobe, Order.

ASBESTOS—2,667 bg. crude, Beira, W. D. Crumpton & Co.

BARIUM CARBONATE—19 csk., Rotterdam, R. W. Greeff & Co.

BRONZE POWDER—10 cs., Bremen, B. F. Drakenfeld & Co.; 16 cs., Bremen, Order; 8 cs., Bremen, Uhlfelder & Co.; 20 cs., Bremen, Hensel, Bruckmann & Lorbacher; 41 cs., Bremen, Baer Bros.

CAMPHOR—45 bbl., Hamburg, Order.

CASEIN—1,000 bg., Buenos Aires, Kalbfleisch corp.; 847 bg., Buenos Aires, National City Bank; 417 bg. Buenos Aires, Order.

CHALK—600 bg., Antwerp, National City Bank; 500 bg., Antwerp, Reichard-Coulston, Inc.; 493 bg., Antwerp, L. A. Salomon & Bro.; 300 bg., Antwerp, Brown Bros. & Co.

CHEMICALS—5 cs., Hamburg, National American Bank; 20 csk., Hanburg, American Aniline Products, Inc.; 30 dr., Hamburg, La Curto & Funk; 45 cs., Hamburg, Order; 60 pkg., Hamburg, Pfaltz & Bauer; 180 csk., Bremen, A. Klipstein & Co.; 82 csk., Bremen, Mechanics & Metals National Bank; 21 csk., Havre, Ciba Co.; 80 carboys and 60 csk., Rotterdam, Roessler & Hasslacher Chem. Co.; 26 cs., Rotterdam, Merck & Co.

CHINA CLAY—32 bg., Hamburg, International Ultramarine Works.

COAL-TAR DISTILLATE—15 dr., Glasgow, W. E. Jordan & Bros.

COLORS—20 cs. earth, Hamburg, J. Lee Smith & Co.; 20 pkg. aniline., Havre, Ciba Co.; 3 csk. do., Havre, Irving Bank-Col. Trust Co.; 23 cs. do., Havre, La Manna, Azema & Farman; 33 csk. earth, Bremen, Fezandie & Sperrie; 15 csk. aniline, Havre, Ciba Co.; 7 csk. do., Havre, Geigy Co.; 2 csk., do., Havre, Ackerman Color Co.; 1 csk., do., Hamburg, Franklin Import & Export Co.; 12 csk. ultramarine blue, Glasgow, A. Maharrie; 2 bbl. aniline, Genoa, Baneo Commercial Italiano; 5 csk., do., Rotterdam, Kuttroff, Pickhardt & Co.; 2 kegs aniline, Liverpool, Order; 11 csk. aniline, London, Geigy Co.

COPPER SULPHATE—20 csk., Liverpool, Order.

COPPER OXIDE — 10 dr., Hamburg, Order.

CORUNDUM ORE — 722 bg., Durban, Standard Bank of South Africa.

CREOSOTE—25 dr., Barrow, American-Hawaiian S.S. Co.

CREAM TARTAR—25 bbl., Marseilles, Order; 50 csk., Rotterdam, Order; 120 bbl. Marseilles, French-American Baking Co.

DIVI-DIVI—231 bg., Monte Cristi, Shawmut National Bank; 1,043 bg., Maracaibo, Suzarte & Whitney.

EPSOM SALT — 25 kegs, Hamburg, Order; 25 bbl. and 250 bg., Hamburg, Order.

FULLERS EARTH—250 bg., London, L. A. Salomon & Bro.

GAMBIER—1,275 cs., Belawan, Order.

GRAPHITE—372 bg., Durban, etc., Barber S.S. Lines; 200 bg., Marseilles, Order.

GLYCERINE—30 dr. crude, Marseilles, Order; 48 dr., do., Barcelona, Order; 14 dr., Liverpool, Order.

GUMS—68 bg. copal, Antwerp, Chemical National Bank; 100 cs. damar, Singapore, Brown Bros. & Co.; 416 bg. karaya, Bombay, Order; 50 cs. olibanum, Bombay, Order; 136 bg. copal, London, Chemical National Bank; 100 cs. damar, Singapore, L. C. Gillespie & Sons; 150 bg., do., Singapore, Chemical National Bank; 50 cs., do., Singapore, American Exchange National Bank.

Opportunities in the Foreign Trade

Parties interested in any of the following opportunities may obtain all available information from the Bureau of Foreign and Domestic Commerce at Washington or from any district office of the bureau. The number placed after the opportunity must be given for the purpose of identification.

ACID, lactic. Sydney, Australia. Agency.—11,303.

CHEMICALS, heavy, solvents, and insecticides. Hamburg, Germany.—Purchase.—11,296.

CHEMICALS, heavy, and amorphous red phosphor and sesquisulphide of phosphorus. Brussels, Belgium. Purchase and agency.—11,311.

DYES, colors and matches. Amritsar, India. Purchase and agency.—11,307.

SODA, caustic. Hamburg, Germany. Purchase.—11,296.

SULPHUR, crude. Calcutta, India. Purchase.—11,295.

FERTILIZERS, artificial. Kovno, Lithuania. Agency.—11,293.

IRON CHLORIDE—20 bbl., Hamburg, Roessler & Hasslacher Chem. Co.

IRON OXIDE—228 bbl., Malaga, American Exchange National Bank; 423 bbl., Malaga, C. K. Williams Co.; 146 bbl., Malaga, Reichard-Coulston, Inc.; 115 bbl., Malaga, Order; 37 csk., Liverpool, Reichard-Coulston Inc.; 10 csk., Liverpool, J. Lee Smith & Co.; 15 csk., Liverpool, Order.

LITHOPONE—275 csk., London, E. M. & F. Waldo.

MAGNESITE—28 csk. calcined, Glasgow, Frasar & Co.; 250 bg. and 100 bbl., Rotterdam, Innis, Speiden & Co.

MAGNESIUM OXIDE — 50 cs., Hamburg, Mechanics & Metals National Bank.

MANGROVE BARK—1,000 bg., Singapore, Order.

MYROBALANS — 3,493 pkt., Calcutta, National City Bank; 2,324 bg., Bombay, Order; 3,025 pkg., Calcutta, Order.

NAPHTHALENE — 200 bg., Hamburg, Order.

OCHER — 100 csk., Antwerp, E. E. Marks & Co.; 178 bbl., Marseilles, Am. Exchange National Bank; 669 bbl., Marseilles, Reichard-Coulston, Inc.; 36 bbl., Marseilles, Order; 100 bbl., Marseilles, J. Lee Smith & Co.

OILS—Chinawood—150 bbl., Shanghai, Viele, Blackwell & Buck; 142 csk., Shanghai, Brown Bros. & Co. **Cod**—25 csk., St. Johns, R. Badcock & Co.; 137 csk., St. Johns, Franklin Agencies, Ltd.; 191 bbl., Copenhagen, Order. **Linseed**—16 bbl., London, Order. **Neatsfoot**—50 tcs., Buenos Aires, Wilson & Co. **Olive foots** (sulphur oil)—100 bbl., Bari., Welch, Holme & Clark Co.; 300 bbl., Naples, Banca Commercial Italiano. **Palm**—41 csk., Hamburg, Order; 51 csk., Rotterdam, Order; 90 bbl., Liverpool, Order; 1,637 csk., Lagos, etc., Niger Co.; 81 csk., Lagos, J. Walsden & Co. **Rapeseed**—300 bbl. (at San Francisco), Yokohama, Order. **Sesame**—300 bbl., Rotterdam, Southern Cotton Oil Co.; 300 bbl., Rotterdam, Meade, King, Robinson & Co.; 205 bbl., Rotterdam, Rayner & Stonington; 50 bbl., Rotterdam, Welch, Holme & Clark Co.; 300 bbl., Copenhagen, Order. **Sperm**—50 bbl., Glasgow, Order. **Shark**—3 bbl., Copenhagen, Order.

OIL SEEDS—Castor—5,464 bg., Bombay, Volkart Bros.; 2,876 bg., Bombay, L. Dreyfus & Co.; 6,830 bg., Bombay, Volkart Bros.; 1,493 bg., Calcutta, Order; 80 bg., Port au Prince, Order. **Copra**—391 bg., Panama, I. Brandon Corp.; 400 bg., Jamaica, Order. **Linseed** — 26,290 bg., Buenos Aires, L. Dreyfus & Co.

PLUMBAGO—68 bbl., Colombo, Order; 95 bbl., Colombo, National City Bank; 147 bbl., Colombo, H. P. Winter & Co.; 510 bg., Colombo, Order.

POTASSIUM SALTS—19 bbl., Hamburg, Roessler & Hasslacher Chem. Co.; 2,000 csk. chlorate, Hamburg, Irving Bank-Col-Trust Co.; 240 dr. caustic, Hamburg, A. Klipstein & Co.; 3 csk. prussiate, Hamburg, Order; 7 cs. cyanide, Bremen, Mallinckrodt Chem. Works; 23 csk. carbonate, Bremen, P. H. Petry & Co.; 300 csk. chlorate, Antwerp, Order; 20 cs. bromide, London, R. W. Greeff & Co.; 47 bbl. alum, Rotterdam, Innis, Speiden & Co.

PYRIDINE—6 dr., Hamburg, Equitable Trust Co.

QUICKSILVER — 50 flasks, Genoa, A. Pickering & Co.; 25 flasks, Tampico, G. Ramos.

QUEBRACHO—1,947 bg., Buenos Aires, Standard Bank of South Africa; 5,090 bg., Buenos Aires, Beekman, Winthrop Co.; 1,000 bg., Buenos Aires, Order.

SHELLAC — 94 cs., Singapore, Order; 425 bg., Calcutta, Lee, Higginson & Co.; 250 bg. Calcutta, Brown Bros & Co.; 200 bg., Calcutta, MacLac Co.; 370 pkg., Calcutta, Marx & Rawolle; 3,710 pkg., Calcutta, Order; 35 bg., Glasgow, Ralli Bros.; 9 cs., Penang, Order.

SODIUM SALTS—30 dr., Hamburg, F. Rudloff; 140 cs. bromide, Hamburg, Order; 210 csk. hyposulphite, Antwerp, East River National Bank; 180 cs. cyanide, Marseilles, International Banking Corp.; 56 cs. and 104 dr. cyanide, Liverpool, F. C. Strype; 20 csk. prussiate, Liverpool, Order; 56 cs. cyanide, Liverpool, Order; 47 csk. prussiate, Liverpool, Order.

STEARINE—58 tcs. oleo, Buenos Aires, Order; 79 tcs, do., Buenos Aires, Swift & Co.; 224 tcs., do., Montevideo, Swift & Co.; 92 csk. oleo, London, Order.

TALLOW—175 tcs., Vancouver, Order.

TARTAR—200 bg., Marseilles, C. Pfizer & Co.; 251 bg., Marseilles, Royal Baking Powder Co.; 99 bg., Valencia, C. Pfizer & Co.; 161 bg., Rotterdam, C. Pfizer & Co.; 55 csk., Naples, Royal Baking Powder Co.; 100 bg., Marseilles, C. Pfizer & Co.

WAXES—400 cs. vegetable, Kobe, National City Bank; 14 cs. beeswax, Alexandria, Order; 20 bg. beeswax, Azua, Mecke & Co.; 17 bg., do., Santo Domingo, J. J. Julia & Co.; 9 bg., do., Santo Domingo, Order; 17 bg., do., Sanchez Yglesias & Co.; 10 pkg., do., Samana, etc., Order; 60 cs. beeswax, Hamburg, Brown Bros. & Co.; 50 bg. beeswax, Montevideo, American Trading Co.; 39 bg. carnauba, Bahia, Bank of London & South Am.; 800 bg. paraffine, London, Asiatic Petroleum Co.; 50 cs. beeswax, London, Order; 33 bg. beeswax, Havana, Order.

WOOL GREASE—50 csk., Bremen, Hummel & Robinson; 50 bbl, Bremen, Bankers Trust Co., 50 bbl., Antwerp, Order.

ZINC CARBONATE—20 csk., Bremen, J. Munroe & Co.

ZINC OXIDE—160 csk., Havre, Coty, Inc.; 50 bbl. Marseilles, Order.

Current Prices in the New York Market

For Chemicals, Oils and Allied Products

THESE prices are for the spot market in New York City, but a special effort has been made to report American manufacturers' quotations whenever available. In many cases these are for material f.o.b. works or on a contract basis and these prices are so designated. Quotations on imported stocks are reported when they are of sufficient importance to have a material effect on the market. Prices quoted in these columns apply to large quantities in original packages.

General Chemicals

Acetone, drums, wks.	lb.	$0.16 –	$0.16½
Acetic anhydride, 85%, dr.	lb.	.34 –	.36
Acid, acetic, 28%, bbl.	100 lb.	3.12 –	3.37
Acetic, 56%, bbl.	100 lb.	5.85 –	6.10
Acetic, 80%, bbl.	100 lb.	8.19 –	8.44
Glacial, 99½%, bbl.	100 lb.	11.01 –	11.51
Boric, bbl.	lb.	.09 –	.09½
Citric, kegs	lb.	.46 –	.47
Formic, 85%	lb.	.12½ –	.13
Gallic, tech.	lb.	.45 –	.50
Hydrofluoric, 52%, carboys	lb.	.11 –	.12
Lactic, 44%, tech., light, bbl.	lb.	.12½ –	.13
22% tech., light, bbl.	lb.	.06 –	.06½
Muriatic, 18° tanks	100 lb.	.80 –	.85
Muriatic, 20°, tanks	100 lb.	.95 –	1.00
Nitric, 36°, carboys	lb.	.04 –	.04½
Nitric, 42°, carboys	lb.	.04½ –	.05½
Oleum, 20%, tanks	ton	16.00 –	17.00
Oxalic, crystals, bbl.	lb.	.09½ –	.09½
Phosphoric, 50% carboys	lb.	.07 –	.08
Pyrogallic, resublimed	lb.	1.55 –	1.60
Sulphuric, 60°, tanks	ton	8.00 –	9.00
Sulphuric, 60°, drums	ton	12.00 –	13.00
Sulphuric, 66°, tanks	ton	13.00 –	14.00
Sulphuric, 66° drums	ton	17.00 –	18.00
Tannic, U.S.P., bbl.	lb.	.65 –	.70
Tannic, tech., bbl.	lb.	.45 –	.50
Tartaric, imp., powd., bbl.	lb.	.27 –	.28
Tartaric, domestic, bbl.	lb.	.29 –	.30
Tungstic, per lb.	lb.	1.20 –	1.25
Alcohol, butyl, drums, f.o.b. works	lb	.30 –	....
Alcohol ethyl (Cologne spirit), bbl.	gal.	4.85 –	....
Ethyl, 190 p'f, U.S.P., bbl.	gal.	4.83 –	....
Alcohol, methyl (see Methanol)			
Alcohol, denatured, 190 proof			
No. 1, special bbl.	gal.	.52 –	....
No. 1, 190 proof, special, dr.	gal.	.46 –	....
No. 1, 188 proof, bbl.	gal.	.55 –	....
No. 1, 188 proof, dr.	gal.	.49 –	....
No. 5, 188 proof, bbl.	gal.	.51 –	....
No. 5, 188 proof, dr.	gal.	.45 –	....
Alum, ammonia, lump, bbl.	lb.	.03½ –	.04
Potash, lump, bbl.	lb.	.02½ –	.03½
Chrome, lump, potash, bbl.	lb.	.05½ –	.06
Aluminum sulphate, com., bags	100 lb.	1.35 –	1.40
Iron free bags	lb.	2.35 –	2.45
Aqua ammonia, 26°, drums	lb.	.06½ –	.06½
Ammonia, anhydrous, cyl.	lb.	.28 –	.30
Ammonium carbonate, powd. tech., casks	lb.	.12½ –	.12½
Ammonium nitrate, tech., casks	lb.	.09 –	.10
Amyl acetate tech., drums	gal.	2.50 –	2.60
Antimony oxide, white, bbl.	lb.	.09½ –	.10
Arsenic, white, powd., bbl.	lb.	.07½ –	.07½
Arsenic, red, powd., kegs	lb.	.14½ –	.15½
Barium carbonate, bbl.	ton	59.00 –	60.00
Barium chloride, bbl.	ton	75.00 –	76.00
Barium dioxide, 88%, drums	lb.	.17½ –	.18
Barium nitrate, casks		.08½ –	.08½
Plane fixe, dry, bbl.	lb.	.03½ –	.04
Bleaching powder, f.o.b. wks., drums	100 lb.	1.90 –	....
Spot N. Y. drums	100 lb.	2.20 –	2.25
Borax, bbl.	lb.	.05 –	.05½
Bromine, cases	lb.	.34 –	.38
Calcium acetate, bags	100 lb.	3.00 –	3.05
Calcium arsenate, dr.	lb.	.09 –	.09½
Calcium carbide, drums	lb.	.05 –	.05½
Calcium chloride, fused, dr. wks.	ton	21.00 –	....
Gran. drums works	ton	27.00 –	....
Calcium phosphate, mono, bbl.	lb.	.06½ –	.07½
Camphor, Jap. cases	lb.	.68 –	.69
Carbon bisulphide, drums	lb.	.06 –	.06½
Carbon tetrachloride, drums	lb.	.06½ –	.07
Chalk, precip.—domestic, light, bbl.	lb.	.04½ –	.04½
Domestic, heavy, bbl.	lb.	.03½ –	.04
Imported, light, bbl.	lb.	.04½ –	.05
Chlorine, liquid, tanks, wks.	lb.	.04½ –	....
Contract, tanks, wks.	lb.	.04½ –	....
Cylinders, 100 lb., wks.	lb.	.05½ –	.07½
Chloroform, tech., drums	lb.	.30 –	.32
Cobalt, oxide, bbl.	lb.	2.10 –	2.25
Copperas, bulk, f.o.b. wks.	ton	15.00 –	16.00
Copper carbonate, bbl.	lb.	.17 –	.17½
Copper cyanide, drums	lb.	.45 –	.46
Copper oxide, kegs	lb.	.16½ –	.17
Coppersulphate, dom., bbl.	100 lb.	4.60 –	4.75
Imp. bbl.	100 lb.	4.37½ –	4.50
Cream of tartar, bbl.	lb.	.21 –	.21½
Epsom salt, dom., tech., bbl.	100 lb.	1.75 –	2.00
Epsom salt, imp., tech., bags	100 lb.	1.30 –	1.35
Epsom salt, U.S.P., dom., bbl.	100 lb.	2.10 –	2.35
Ether, U.S.P., dr concent'd.	lb.	.13 –	.14
Ethyl acetate, 85%, drums	gal.	.92 –	.95
Ethyl acetate, 99%, dr.	gal.	$1.08 –	$1.10
Formaldehyde, 40%, bbl.	lb.	.09 –	.09½
Fullers earth—f.o.b. mines	ton	7.50 –	18.00
Furfural, works, bbl.	lb.	.25 –	....
Fusel oil, ref., drums	gal.	2.75 –	3.50
Fusel oil, crude, drums	gal.	1.50 –	1.75
Glaubers salt, wks., bags	100 lb.	1.20 –	1.40
Glaubers salt, imp., bags	100 lb.	.90 –	.92
Glycerine, c.p., drums extra	lb.	.18½ –	.18½
Glycerine, dynamite, drums	lb.	.17½ –	....
Glycerine, crude 80%, loose	lb.	.12 –	....
Hexamethylene, drums	lb.	.65 –	.70
Lead:			
White, basic carbonate, dry, casks	lb.	.10 –	....
White, basic sulphate, casks	lb.	.09½ –	....
White, in oil, kegs	lb.	.11½ –	.11½
Red, dry, casks	lb.	.11 –	....
Red, in oil, kegs	lb.	.13½ –	.13½
Lead acetate, white crys., bbl.	lb.	.14½ –	....
Brown, broken, casks	lb.	.13½ –	....
Lead arsenate, powd., bbl.	lb.	.16 –	.18
Lime-Hydrated, bg. wks.	ton	10.50 –	12.50
Bbl., wks.	ton	18.00 –	19.00
Lime, Lump, bbl.	280 lb.	3.63 –	3.65
Litharge, comm., casks	lb.	.10½ –	....
Lithopone, bags	lb.	.06½ –	.06½
Magnesium carb., tech., bags	lb.	.08½ –	.08½
Methanol, 95%, bbl.	gal.	.74 –	.76
Methanol, 97%, bbl.	gal.	.76 –	.78
Methanol, pure, tanks	gal.	.75 –	....
drums	gal.	.78 –	.80
bbl.	gal.	.83 –	.85
Methyl-acetone, t'ks.	gal.	.70 –	....
Nickel salt, double, bbl.	lb.	.09 –	.10½
Nickel salts, single, bbl.	lb.	.10 –	.11
Orange mineral, cak	lb.	.14 –	.14½
Phosgene		.60 –	.75
Phosphorus, red, cases	lb.	.70 –	.75
Phosphorus, yellow, cases	lb.	.37½ –	.40
Potassium bichromate, casks	lb.	.08½ –	.09
Potassium bromide, gran., bbl.	lb.	.25 –	.38
Potassium carbonate, 80-85%, calcined, casks	lb.	.05½ –	.05½
Potassium chlorate, powd.	lb.	.07 –	.08½
Potassium cyanide, drums	lb.	.47 –	.52
Potassium, first sorts, cask	lb.	.08½ –	.08½
Potassium hydroxide (caustic potash) drums	lb.	.06½ –	.06½
Potassium iodide, cases	lb.	3.65 –	3.75
Potassium nitrate, bbl.	lb.	.06 –	.07½
Potassium permanganate drums	lb.	.13½ –	.14
Potassium prussiate, red, casks	lb.	.36 –	.38
Potassium prussiate, yellow, casks	lb.	.18 –	.18½
Salammoniac, white, gran., casks, imported	lb.	.06½ –	.06½
Salammoniac, white, gran., bbl., domestic	lb.	.07½ –	.08
Gray, gran., casks	lb.	.08 –	.09
Salsoda, bbl.	100 lb.	1.20 –	1.40
Salt cake (bulk) works	ton	16.00 –	18.00
Soda ash, light, 58% flat, bulk, contract	100 lb.	1.25 –	....
bags, contract	100 lb.	1.38 –	....
Soda ash, dense, bulk, contract, basis 58%	100 lb.	1.35 –	....
bags, contract	100 lb.	1.45 –	....
Soda, caustic, 76%, solid, drums contract	100 lb.	3.10 –	....
Soda, caustic, ground and flake, contracts, dr.	100 lb.	3.50 –	3.85
Soda, caustic, solid, 76% f. a.s. N. Y.	100 lb.	2.80 –	3.05
Sodium acetate, works, bbl.	lb.	.04½ –	.05
Sodium bicarbonate, bulk	100 lb.	1.75 –	....
330-lb. bbl.	100 lb.	2.00 –	....
Sodium bichromate, casks	lb.	.06½ –	.07
Sodium bisulphate (niter cake)	ton	6.00 –	7.00
Sodium bisulphite, powd., U.S.P., bbl.	lb.	.04½ –	.04½
Sodium chlorate, kegs	lb.	.06½ –	.07
Sodium chloride	long ton	12.00 –	13.00
Sodium cyanide, cases	lb.	.19 –	.22
Sodium fluoride, bbl.	lb.	$0.08½ –	$0.09
Sodium hyposulphite, bbl.	lb.	.02½ –	.02½
Sodium nitrite, casks	lb.	.08½ –	.09
Sodium peroxide, powd., cases	lb.	.23 –	.27
Sodium phosphate, dibasic, bbl.	lb.	.03½ –	.03½
Sodium prussiate, yel. bbl.	lb.	.09½ –	.10
Sodium salicylic, drums	lb.	.38 –	.40
Sodium silicate (40°, drums)	100 lb.	.75 –	1.15
Sodium silicate (60°, drums)	100 lb.	1.75 –	2.00
Sodium sulphide, fused, 60-62% drums	lb.	.03 –	.03½
Sodium sulphite, crys., bbl.	lb.	.02 –	.02½
Strontium nitrate, powd., bbl.	lb.	.09½ –	.10
Sulphur chloride, yel drums	lb.	.04½ –	.05
Sulphur, crude	ton	18.00 –	20.00
At mine, bulk	ton	16.00 –	18.00
Sulphur, flour, bag	100 lb.	2.25 –	2.35
Sulphur, roll, bag	100 lb.	2.00 –	2.10
Sulphur dioxide, liquid, cyl.	lb.	.08 –	.08
Tin bichloride, bbl.	lb.	.14 –	....
Tin oxide, bbl.	lb.	.55 –	....
Tin crystals, bbl.	lb.	.35½ –	....
Zinc carbonate, bags	lb.	.12 –	.14
Zinc chloride, gran, bbl.	lb.	.06 –	.07½
Zinc cyanide, drums	lb.	.36½ –	.37
Zinc dust, bbl	lb.	.08½ –	.08½
Zinc oxide, lead free, bag	lb.	.07½ –	....
5% lead sulphate bags	lb.	.06½ –	....
10 to 35 % lead sulphate, bags	lb.	.06½ –	....
French, red seal, bags	lb.	.09½ –	....
French, green seal, bags	lb.	.10½ –	....
French, white seal, bbl.	lb.	.11½ –	....
Zinc sulphate, bbl.	100 lb.	3.00 –	3.25

Coal-Tar Products

Alpha-naphthol, crude, bbl.	lb.	$0.60 –	$0.65
Alpha-naphthol, ref., bbl.	lb.	.65 –	.75
Alpha-naphthylamine, bbl.	lb.	.35 –	.36
Aniline oil, drums	lb.	.16 –	.16½
Aniline salt, bbl.	lb.	.21 –	.22
Anthracene, 80%, drums	lb.	.70 –	.75
Anthraquinone, 25%, paste, drums	lb.	.75 –	.80
Benzaldehyde U.S.P., carboys	lb.	1.50 –	....
f.f.c. drums	lb.	1.60 –	....
tech, drums	lb.	68	.72
Benzene, pure, water-white, tanks, works	gal.	.25 –	....
Benzene, 90%, tanks, works	gal.	.23 –	....
Benzidine base, bbl.	lb.	.80 –	.82
Benzidine sulphate, bbl.	lb.	.70 –	.72
Benzoic acid, U.S.P., kegs	lb.	.75 –	85
Benzoate of soda, U.S.P., bbl.	lb.	.65 –	.70
Benzyl chloride, 95-97%, ref. carboys	lb.	.35 –	....
Benzyl chloride, tech., drums	lb.	.25 –	....
Beta-naphthol, tech., bbl.	lb.	.24 –	.25
Beta-naphthylamine, tech.	lb.	.65 –	.70
Cresol, U.S.P., drums	lb.	.23 –	.26
Ortho-cresol, drums	lb.	.28 –	.32
Cresylic acid, 97%, works drums	gal.	.63 –	.65
95-97%, drums, works	gal.	.58 –	.60
Dichlorbenzene, drums	lb.	.07 –	.08
Diethylaniline, drums	lb.	.52 –	.56
Dimethylaniline, drums	lb.	.35 –	.36
Dinitrobenzene, bbl.	lb.	.15 –	.17
Dinitrochlorbenzene, bbl.	lb.	.21 –	.22
Dinitronaphthalen, bbl.	lb.	.30 –	.32
Dinitrophenol, bbl.	lb.	.35 –	.40
Dinitrotoluen, bbl.	lb.	.18 –	.20
Dip oil, 25%, drums	gal.	.26 –	.28
Diphenylamine, bbl.	lb.	.48 –	.50
H-acid, bbl.	lb.	.72 –	.75
Meta-phenylenediamine, bbl.	lb.	.95 –	1.00
Michlers ketone, bbl.	lb.	3.00 –	3.25
Monochlorbenzene, drums	lb.	.08 –	.10
Monoethylaniline, drums	lb.	1.20 –	1.30
Naphthalene, flake, bbl.	lb.	.04½ –	.05½
Naphthalene, balls, bbl.	lb.	.05½ –	.05½
Naphthionate of soda, bbl.	lb.	.60 –	.65
Naphthionic acid, crude, bbl.	lb.	.60 –	.62
Nitrobenzene, drums	lb.	.09 –	.09½
Nitro-naphthalene, bbl.	lb.	.25 –	.27
Nitro-toluene, drums	lb.	.13½ –	.14
N-W acid, bbl.	lb.	1.00 –	1.05
Ortho-amidophenol, kegs	lb.	2.40 –	2.50
Ortho-dichlorbenzene, drums	lb.	.12 –	.13
Ortho-nitrophenol, bbl.	lb.	.95 –	1.00
Ortho-nitrotoluene, drums	lb.	.11 –	.12
Ortho-toluidine, bbl.	lb.	.14 –	.15
Para-aminophenol, base, kegs	lb.	1.20 –	1.25
Para-aminophenol, HCl, kegs	lb.	1.30 –	1.40
Para-dichlorbenzene, bbl.	lb.	.17 –	.20
Paranitraniline, bbl.	lb.	.68 –	.70
Para-nitrotoluene, bbl.	lb.	.50 –	.55
Para-phenylenediamine, bbl.	lb.	1.35 –	1.45
Para-toluidine, bbl	lb.	.75 –	.80
Phthalic anhydride, bbl.	lb.	.30 –	.34
Phenol, U.S.P., dr.	lb.	.24 –	.26
Picric acid, bbl.	lb.	.20 –	.22
Pitch, tanks, works	ton	27.00 –	30.00
Pyridine, imp., drums	gal.	3.90 –	4.00
Resorcinol, tech., kegs	lb.	1.30 –	1.40

Resorcinol, pure, kegs	lb.	$2.00 –	$2.25
R-salt, bbl.	lb.	.50 –	.55
Salicylic acid, tech., bbl.	lb.	.32 –	.33
Salicylic acid, U.S.P., bbl.	lb.	.35 –	...
Solvent naphtha, water-white, tanks	gal.	.25 –	....
Crude, tanks	gal.	.22 –	....
Sulphanilic acid, crude, bbl.	lb.	.16 –	.18
Toluidine, bbl.	lb.	1.00 –	1.05
Toluidine, mixed, kegs	lb.	.30 –	.35
Toluene, tank cars, works	gal.	.26 –	....
Toluene, drums, works	gal.	.30 –	....
Xylidine, drums	lb.	.40 –	.42
Xylene, 5 deg.-tanks	gal.	.38 –	.40
Xylene, com., tanks	gal.	.26 –	.28

Naval Stores

Rosin B-D, bbl. 280 lb.		$5.85 –	$5.90
Rosin E-I, bbl. 280 lb.		5.95 –	6.05
Rosin K-N, bbl. 280 lb.		6.10 –	6.20
Rosin W.G.-W.W., bbl. 280 lb.		7.20 –	7.70
Wood rosin, bbl. 280 lb.		5.40 –	5.50
Turpentine, spirits of, bbl.	gal.	.91 –	.....
Wood, steam dist., bbl.	gal.	.75 –	.....
Wood, dest. dist., bbl.	gal.	.56 –	.....
Pine tar pitch, bbl. 200 lb.		5.50 –	.....
Tar, kiln burned, bbl. 500 lb.		10.50 –	.....
Retort tar, bbl. 500 lb.		10.50 –	.....
Rosin oil, first run, bbl.	gal.	.38 –	.....
Rosin oil, second run, bbl.	gal.	.43 –	.....
Rosin oil, third run, bbl.	gal.	.48 –	.....
Pine oil, steam dist.	gal.	.60 –	.....
Pine tar oil, com'l	gal.	.30 –	.....

Animal Oils and Fats

Degras, bbl.	lb.	$0.03½ –	$0.05½
Grease, yellow, loose	lb.	.07½ –	.08
Lard oil, Extra No. 1, bbl.	gal.	.84 –	.85
Lard compound, bbl.	lb.	.16 –	.16½
Neatsfoot oil, 20 deg., bbl.	gal.	1.30 –	.....
No. 1, bbl.	gal.	.84 –	.86
Oleo Stearine		.17 –	.....
Oleo oil, No. 1, bbl.	lb.	.16½ –	.....
Red oil, distilled, d.p. bbl.	lb.	.09½ –	.09½
Saponified, bbl.	lb.	.09½ –	.09½
Tallow, extra, loose works	lb.	.08½ –	.....
Tallow oil, acidless, bbl.	gal.	.84 –	.86

Vegetable Oils

Castor oil, No. 3, bbl.	lb.	$0.16½ –	.....
Castor oil, No. 1, bbl.	lb.	.17 –	.....
Chinawood oil, bbl.	lb.	.14½ –	.15
Coconut oil, Ceylon, bbl.	lb.	.10½ –	.10¾
Ceylon, tanks, N.Y.	lb.	.09¾ –	.09½
Cocoanut oil, Cochin, bbl.	lb.	.10¾ –	.11½
Corn oil, crude, bbl.	lb.	.13½ –	.14
Crude, tanks, (f.o.b. mill)	lb.	.12½ –	.....
Cottonseed oil, crude (f.o.b. mill), tanks	lb.	11.90 –	.....
Summer yellow, bbl.	lb.	.15 –	.....
Winter yellow, bbl.	lb.	.15½ –	.16
Linseed oil, raw, car lots, bbl.	gal.	1.02 –	.....
Raw, tank cars (dom.)	gal.	.96 –	.....
Boiled, cars, bbl. (dom.)	gal.	1.04 –	.....
Olive oil, denatured, bbl.	gal.	1.15 –	1.20
Sulphur, (foots) bbl.	lb.	.09½ –	.09½
Palm, Lagos, casks	lb.	.08½ –	.....
Niger, casks	lb.	.08½ –	.....
Palm kernel, bbl.	lb.	.10 –	.....
Peanut oil, crude, tanks (mill)	lb	.13 –	.....
Peanut oil, refined, bbl.	lb.	.17 –	.17½
Perilla, bbl	lb.	.14 –	.14½
Rapeseed oil, refined, bbl.	gal.	.88 –	.....
Sesame, bbl.	lb.	.14 –	.14½
Soya bean (Manchurian), bbl.	lb.	.12 –	.12½
Tank, f.o.b. Pacific coast	lb.	.10½ –	.10½
Tank, (f.o.b. N.Y.)	lb.	.11 –	.11½

Fish Oils

Cod, Newfoundland, bbl.	gal.	$0.63 –	$0.65
Menhaden, light pressed, bbl.	gal.	.64 –	.....
White bleached, bbl.	gal.	.66 –	.....
Blown, bbl.	gal.	.68 –	.....
Crude, tanks (f.o.b. factory)	gal.	.50 –	.....
Whale No. 1 crude, tanks, coast	lb.	.....	.....
Winter, natural, bbl.	gal.	.75 –	.76
Winter, bleached, bbl.	gal.	.78 –	.79

Oil Cake and Meal

Coconut cake, bags	ton	$33.00 –	34.00
Cottonseed meal, f.o.b. mills	ton	44.00 –	45.00
Linseed cake, bags	ton	44.00 –	.....
Linseed meal, bags, spot	ton	46.00 –	.....

Dye & Tanning Materials

Albumen, blood, bbl.	lb.	$0.50 –	$0.55
Albumen, egg, tech, kegs	lb.	.95 –	.97
Cochneal, bags	lb.	.33 –	.35
Cutch, Borneo, bales	lb.	.04½ –	.04¾
Cutch, Rangoon, bales	lb.	.13½ –	.14½
Dextrine, corn, bags 100 lb.		4.52 –	4.57
Dextrine gum, bags 100 lb.		4.82 –	5.09
Divi-divi, bags	ton	40.00 –	42.00
Fustic, sticks	ton	30.00 –	35.00
Fustic, chips, bags	lb.	.04 –	.05
Gambier com., bags	lb.	.12½ –	.13
Logwood, sticks	ton	25.00 –	26.00
Logwood, chips, bags	lb.	.02½ –	.03
Sumac, leaves, Sicily, bags	ton	125.00 –	130.00
Sumac, ground, bags	ton	123.00 –	.....
Sumac, domestic, bags	ton	50.00 –	55.00
Starch, corn, bags 100 lb.		3.87 –	4.08
Tapioca flour, bags	lb.	.04½ –	.06

Extracts

Archil, conc., bbl.	lb.	$0.16 –	$0.19
Chestnut, 25% tannin, tanks	lb.	.01½ –	.02
Divi-divi, 25% tannin, bbl.	lb.	.05 –	.05½
Fustic, crystals, bbl.	lb.	.20 –	.22
Fustic, liquid, 42°, bbl.	lb.	.08 –	.09
Gambier, liq., 25% tannin, bbl.	lb.	.11 –	.11½
Hematine crys., bbl.	lb.	.14 –	.18
Hemlock, 25% tannin, bbl.	lb.	.03½ –	.04
Hypernic, solid, drums	lb.	.22 –	.24
Hypernic, liquid, 51°, bbl.	lb.	.12 –	.13
Logwood, crys., bbl.	lb.	.14 –	.15
Logwood, liq., 51°, bbl.	lb.	.07½ –	.08½
Osage Orange, 51°, liquid, bbl.	lb.	.07 –	.08
Osage Orange, powder, bg.	lb.	.14 –	.15
Quebracho, solid, 65% tannin, bbl.	lb.	.04½ –	.04¾
Sumac, dom., 51°, bbl.	lb.	.06½ –	.06¾

Dry Colors

Blacks–Carbongas, bags, f.o.b. works, contract	lb.	$0.09 –	$0.11
spot, cases	lb.	.12 –	.16
Lampblack, bbl.	lb.	.12 –	.40
Mineral, bulk	ton	35.00 –	45.00
Blues–Bronze, bbl.	lb.	.36 –	.38
Prussian, bbl.	lb.	.36 –	.38
Ultramarine, bbl.	lb.	.07 –	.35
Browns, Sienna, Ital., bbl.	lb.	.05 –	.12
Sienna, Domestic, bbl.	lb.	.03 –	.03½
Umber, Turkey, bbl.	lb.	.04 –	.04½
Greens–Chrome, C.P. Light, bbl.	lb.	.28 –	.30
Chrome, commercial, bbl.	lb.	.11 –	.11½
Paris, bulk	lb.	.24 –	.26
Reds, Carmine No. 40, tins	lb.	4.25 –	4.50
Iron oxide red, casks	lb.	.08 –	.12
Para toner, kegs	lb.	.95 –	1.00
Vermilion, English, bbl.	lb.	1.30 –	1.35
Yellow, Chrome, C.P. bbls.	lb.	.17 –	.17½
Ocher, French, casks	lb.	.02 –	.03

Waxes

Bayberry, bbl.	lb.	$0.21 –	$0.21½
Beeswax, crude, Afr. bg.	lb.	.25 –	.26
Beeswax, refined, light, bags	lb.	.32 –	.34
Beeswax, pure white, cases	lb.	.40 –	.41
Candelilla, bags	lb.	.23 –	.23½
Carnauba, No. 1, bags	lb.	.34 –	.36
No. 2, North Country, bags	lb.	.26 –	.27
No. 3, North Country, bags	lb.	.22 –	.22½
Japan, cases	lb.	.18½ –	.19
Montan, crude, bags	lb.	.05½ –	.06
Paraffine, crude, match, 105-110 m.p., bbl.	lb.	.05½ –	....
Crude, scale 124-126 m.p. bags	lb.	.05½ –	....
Ref., 118-120 m.p., bags	lb.	.05½ –	....
Ref., 123-125 m.p., bags	lb.	.05½ –	....
Ref, 128-130 m.p., bags	lb.	.06 –	....
Ref., 133-135 m.p., bags	lb.	.07 –	.07½
Ref., 135-137 m.p., bags	lb.	.07½ –	.07½
Stearic acid, agle pressed, bags	lb.	.11½ –	.11½
Double pressed, bags	lb.	.11½ –	.12
Triple pressed, bags	lb.	.12½ –	.13

Fertilizers

Acid phosphate, 16%, bulk, works	ton	$7.50 –	$7.75
Ammonium sulphate, bulk f.o.b. works 100 lb.		2.75 –	.....
Blood, dried, bulk	unit	4.10 –	4.15
Bone, raw, 3 and 50, ground	ton	26.00 –	28.00
Fish scrap, dom., dried, wks.	unit	3.50 –	.....
Nitrate of soda, bags 100 lb.		2.50 –	.....
Tankage, high grade, f.o.b. Chicago	unit	2.50 –	.....
Phosphate rock, f.o.b. mines Florida pebble, 68-72%	ton	3.25 –	3.70
Tennessee, 75%	ton	6.75 –	7.00
Potassium muriate, 80%, bags	ton	34.55 –	.....
Potassium sulphate, bags basis 90%	ton	45.85 –	.....
Double manure salt	ton	26.35 –	.....
Kainit	ton	7.22 –	.....

Crude Rubber

Para—Upriver fine	lb.	$0.26½ –	.27
Upriver coarse	lb.	.19 –	.....
Upriver caucho ball	lb.	.19 –	.....
Plantation—First latex crepe	lb.	.27½ –	.....
Ribbed smoked sheets	lb.	.26½ –	.....
Amber crepe No. 1	lb.	.26½ –	.....

Gums

Copal, Congo, amber, bags	lb.	$0.08 –	$0.10
East Indian, bold, bags	lb.	.13 –	.14
Manila, pale, bags	lb.	.18 –	.19
Pontinak, No. 1 bags	lb.	.19 –	.20
Damar, Batavia, cases	lb.	.24 –	.24½
Singapore, No. 1, cases	lb.	.26 –	.26½
Singapore, No. 2, cases	lb.	.18 –	.18½
Kauri, No. 1, cases	lb	.58 –	.64
Ordinary chips, cases	lb.	.21 –	.22
Manjak, Barbados, bags	lb.	.06 –	.09

Shellac

Shellac, orange fine, bags	lb.	$0.59 –	$0.60
Orange superfine, bags	lb.	.61 –	.62
A. C. garnet, bags	lb.	.55 –	....
Bleached, bonedry	lb.	.67 –	....
Bleached, fresh	lb.	.56 –	....
T. N., bags	lb.	.57 –	....

Miscellaneous Materials

Asbestos, crude No. 1 f.o.b., Quebec sh. ton		$300.00 –	$400.00
Asbestos, shingle, f.o.b., Quebec sh. ton		50.00 –	70.00
Asbestos, cement, f.o.b., Quebec sh. ton		20.00 –	25.00
Barytes, grd., white, f.o.b. mills, bbl. net ton		16.00 –	17.00
Barytes, grd., off-color, f.o.b. Balt. net ton		13.00 –	14.00
Barytes, floated, f.o.b. St. Louis, bbl. net ton		23.00 –	24.00
Barytes, crude f.o.b. mines, bulk net ton		8.00 –	9.00
Casein, bbl., tech. lb.		.11 –	.12
China clay (kaolin) crude, No. 1, f.o.b. Ga. net ton		7.00 –	8.00
Washed, f.o.b. Ga. net ton		8.50 –	9.00
Powd., f.o.b. Ga. net ton		14.00 –	20.00
Crude f.o.b. Va. net ton		6.00 –	8.00
Ground, f.o.b. Va. net ton		13.00 –	19.00
Imp., lump, bulk net ton		15.00 –	20.00
Imp., powd. net ton		45.00 –	50.00
Feldspar, No. 1 f.o.b. N.C. long ton		6.50 –	7.25
No. 2 f.o.b. N.C. long ton		4.50 –	5.00
No. 1 gr'd. N. C. long ton		15 32 –	21.00
No. 1 Canadian, f.o.b. mill, powd. long ton		20.00 –	.....
Graphite, Ceylon, lump, first quality, bbl. lb.		.05½ –	.06
Ceylon, chip, bbl. lb.		.04½ –	.05
High grade amorphous crude ton		15.00 –	35.00
Gum arabic, amber, sorts, bags lb.		.11½ –	.11¾
Gum tragacanth, sorts, bags lb.		.50 –	.51
No. 1, bags lb.		1.20 –	.....
Kieselguhr, f.o.b. Cal. ton		40.00 –	42.00
F.o.b. N. Y. ton		50.00 –	55.00
Magnesite, calcined, f.o.b. Cal. ton		35.00 –	45.00
Pumice stone, imp., casks lb.		.03 –	.40
Dom., lump, bbl. lb.		.06 –	.08
Dom., ground, bbl. lb.		.03 –	.05
Silica, glass sand, f.o.b. Ind. ton		2.00 –	2.25
Silica, sand blast, f.o.b. Ind. ton		2.25	3.50
Silica, amorphous, 200-mesh, f.o.b. Ill. ton		20.00 –	.....
Silica, glass sand, f.o.b. Ill. ton		2.00 –	2.50
Soapstone, coarse, f.o.b. Vt., bags ton		7.50 –	8.00
Talc, 200 mesh, f.o.b., Vt., bags, extra ton		10.50 –	.....
Talc, 200 mesh, f.o.b. Ga., bags ton		9.50 –	10.00
Talc, 325 mesh, f.o.b. New York, grade A bags ton		14.75 –	.....

Mineral Oils

Crude, at Wells

Pennsylvania	bbl.	$2.75 –	$3.00
Corning	bbl.	1.75 –	.....
Cabell	bbl.	1.45 –	.....
Somerset	bbl.	1.55 –	.....
Illinois	bbl.	1.62 –	.....
Indiana	bbl.	1.63 –	.....
Kansas and Okla. under 28 deg.	bbl.	.90 –	.....
California, 35 deg. and up	bbl.	1.40 –	.....

Gasoline, Etc.

Motor gasoline, steel bbls	gal.	$0.19 –	.....
Naphtha, V. M. & P. deod, steel bbls	gal	.18 –	.....
Kerosene, ref. tank wagon	gal.	.13 –	.....
Bulk, W.W. delivered, N.Y.	gal.	.07½ –	.07¾
Lubricating oils:			
Cylinder, Penn., filtered	gal.	.29 –	.32
Bloomless, 30@31 grav.	gal.	.20 –	.21
Paraffin, pale 885 vis	gal.	.15½ –	.16½
Spindle, 200, pale	gal.	.21 –	.21½
Petrolatum, amber, bbls	lb.	.04 –	.04½
Paraffine wax (see waxes)			

Refractories

Bauxite brick, 56% Al_2O_3, f.o.b. Pittsburgh	1,000	$140-$145
Chrome brick, f.o.b. Eastern shipping points	ton	50-..
Chrome cement, 40-50% Cr_2O_3	ton	23-27
40-45% Cr_2O_3, sacks, f.o.b. Eastern shipping points	ton	23.00
Fireclay brick, 1st. quality, 9-in. shapes, f.o.b. Ky. wks.	1,000	42-45
2nd. quality, 9-in. shapes, f.o.b. wks.	1,000	35-38
Magnesite brick, 9-in. straight (f.o.b. wks.)	ton	65-68
9-in. arches, wedges and keys	ton	80-85
Scraps and splits	ton	85
Silica brick, 9-in. sizes, f.o.b. Chicago district	1,000	48-50
Silica brick, 9-in. sizes, f.o.b. Birmingham district	1,000	48-50
F.o.b. Mt. Union, Pa.	1,000	38-39
Silicon carbide refract. brick, 9-in.	1,000	1,180.00

Ferro-Alloys

Ferrotitanium, 15-18% f.o.b. Niagara Falls, N.Y.	ton	$200.00 –	.....

Ferrochromium, per lb. of Cr, 1-2% C	lb.	$0.30 –
4-6% C	lb.	.12½–
Ferromanganese, 78-82% Mn, Atlantic seabd. duty paid	gr.ton	95.00 –
Spiegeleisen, 19-21% Mn.	gr.ton	35.00 – 36.00
Ferromolybdenum, 50-60% Mo, per lb. Mo	lb.	2.00 – 2.25
Ferrosilicon, 10-12%	gr.ton	39.50 – 43.50
50%	gr.ton	72.00 – 75.00
Ferrotungsten, 70-80% per lb. of W	lb.	.90 – .93
Ferro-uranium, 35-50%, of U, per lb. of U	lb.	4.50 –
Ferrovanadium, 30-40% per lb. of V	lb.	3.25 – 3.75

Ores and Semi-finished Products

Bauxite, dom. crushed, dried, f.o.b. shipping points	ton	$5.50 – $8.75
Chrome ore, Calif. concentrates, 50% min. Cr_2O_3	ton	22.00 –
C.i.f. Atlantic seaboard	ton	19 00 – 23.00
Coke, fdry., f.o.b. ovens	ton	4.00 – 4.50
Coke, furnace, f.o.b. ovens	ton	3.00 – 3.25
Fluorspar, gravel, f.o.b. mines, Illinois	ton	22.00 – 23.50
Ilmenite, 52% TiO_2 Va	lb.	.01½–
Manganese ore, 50% Mn, c.i.f. Atlantic seaport	unit	.42 – .46
Manganese ore, chemical (MnO_2)	ton	75.00 – 80.00
Molybdenite 85% MoS_2, per lb. MoS_2, N. Y.	lb.	.75 –
Monazite, per unit of ThO_2, c.i.f., Atl. seaport	lb.	.06 – .08
Pyrites, Span., fines, c.i.f. Atl. seaport	unit	.11½– .12
Pyrites, Span., furnace size, c.i.f. Atl. seaport	unit	.12 –
Pyrites, dom. fines, f.o.b. mines, Ga.	unit	.12 –
Rutile, 94@96% TiO_2	lb.	.12 – .15
Tungsten, scheelite, 60% WO_3 and over	unit	9.00 –
Tungsen, wolframite, white, 60% WO_3	unit	8.50 – 8.75
Uranium ore (carnotite) per lb. of U_3O_8	lb.	3.50 – 3.75
Uranium oxide, 96% per lb. U_3O_8	lb.	12.25 – 12.50
Vanadium pentoxide, 99%	lb.	2.50 – 4.00
Vanadium ore, per lb. V_2O_5	lb.	1.00 – 1.25
Zircon, 99 %	lb.	.06 – .07

Non-Ferrous Metals

Copper, electroly tic	lb.	$0.13½– $0.13¾
Aluminum, 98 to 99%	lb.	.26½– .28
Antimony, wholesale, Chinese and Japanese	lb.	.10½– .10¾
Nickel, 99%	lb.	.27 – .30
Monel metal, shot and blocks	lb.	.32
Tin, 5-ton lots, Straits	lb.	.53½
Lead, New York, spot	lb.	.08
Lead, E. St. Louis, spot	lb.	.08
Zinc, spot, New York	lb.	.0660
Zinc, spot, E. St. Louis	lb.	.0625
Silver (commercial)	oz.	.68¾
Cadmium	lb.	.60
Bismuth (500 lb. lots)	lb.	2.00–2.15
Cobalt	lb.	2.50–3.00
Magnesium, ingots, 99%	lb.	.90–.95
Platinum, refined	oz.	120.00
Iridium	oz.	260.00–270.00
Palladium, refined	oz.	78.00–83.00
Mercury	75 lb.	72.00–73.00
Tungsten powder	lb.	.95–1.00

Finished Metal Products

	Warehouse Price Cents per Lb.
Copper sheets, hot rolled	20.37½
Copper bottoms	29.25
Copper rods	20.00
High brass rods	17.25
High brass rods	15.00
Low brass wire	19.50
Low brass rods	20.00
Brazed bronze tubing	24.75
Seamless copper tubing	22.75
Seamless high brass tubing	21.50

OLD METALS—The following are the dealers purchasing prices in cents per pound:

Copper, heavy and crucible	10.75 @ 11.00
Copper, heavy and wire	10.25 @ 10.37½
Copper, light and bottoms	8.50 @ 8.75
Lead, heavy	6.50 @ 6.75
Lead, tea	3.75 @ 4 00
Brass, heavy	5.50 @ 6.00
Brass, light	5.00 @ 5.25
No. 1 yellow brass turnings	6.75 @ 7.25
Zinc scrap	4.00 @ 4.25

Structural Material

The following base prices per 100 lb. are for structural shapes 3 in. by ¼ in. and larger, and plates ¼ in. and heavier, from jobbers' warehouses in the cities named:

	New York	Chicago
Structural shapes	$3.34	$3.34
Soft steel bars	3.24	3.24
Soft steel bar shapes	3.54	3.54
Soft steel bands	4.09	4.09
Plates, ¼ to 1 in. thick	3 34	3.34

Industrial

Financial, Construction and Manufacturing News

Construction and Operation

Alabama

MONTGOMERY—The Alabama Cotton Oil Co., recently acquired by Edward T. Allen and associates, has purchased the former local mill of the American Cotton Oil Co., as well as similar plant of the same company at Huntsville, Ala. Plans are under way for extensions and improvements at the two mills, with the installation of equipment for early operation. It is said that the purchasing company will be reorganized and capital increased to provide for expansion.

BIRMINGHAM—The Birmingham Slag Co. has preliminary plans under way for the rebuilding of its screening plant at Gadsden, Ala., recently destroyed by fire with loss approximating $37,000, including equipment, which will be replaced.

Arkansas

LITTLE ROCK — The Arkansas Foundry Co. is said to have preliminary plans under advisement for the rebuilding of the portion of its plant at the foot of East 6th St., recently destroyed by fire with loss reported at $45,000, including equipment. The company specializes in the manufacture of brass, bronze and kindred metal castings.

California

SAN BERNARDINO—A. C. Brunton, care of the Frank C. Platt Investment Co., San Bernardino, is perfecting plans for the organization of a company and the erection of a new local plant for the manufacture of a line of paint products, estimated to cost approximately $30,000, with equipment.

STOCKTON — The Pacific Window Glass Co., Los Angeles, organized a few months ago, has purchased the local plant of the Patterson Glass Co., and will take possession immediately. The works have been devoted to the manufacture of window glass, and the new owner will make a number of extensions and betterments and place in service at an early date. It is purposed to provide additional equipment later. E. P. Jones is president of the purchasing company; S. E. Pierce is treasurer; and Charles Martin works manager.

NATIONAL CITY—The Spreckels Brothers Commercial Co., San Diego, has preliminary plans under way for the rebuilding of the portion of its local fertilizer plant, recently destroyed by fire with loss estimated at $22,000, including equipment.

LOS ANGELES—The Alloy Steel & Metals Co., 1900 East 55th St., has filed plans for the erection of a 1-story building at its plant.

CROCKETT—The California & Hawaiian Sugar Refining Co., has awarded a general contract to the Moore Dry Dock Co., foot of Adeline St., Oakland, for the erection of a new building at its local refinery, comprising the first of a number of contemplated extensions. It will be 1-story, 250x460 ft., to cost in excess of $500,000. The entire expansion program will involve about $1,250,000. A. A. Brown, 215 Market St., San Francisco, is consulting engineer.

Florida

PORT TAMPA—The Standard Oil Co., Tampa, has plans for extensions and improvements in its local storage and distributing plant to provide for an increase of about 50,000 bbl. in capacity, including the installation of steel tanks and other equipment.

Georgia

CAMILLA — The Camilla Cottonseed Oil Mill has been purchased by new interests headed by C. S. Carter and Leon Perry. Possession of the local mill will be taken at once, with plans for extensions and betterments, with additional equipment.

Indiana

FORT WAYNE—The Northern Indiana Gas & Electric Co. has filed plans for a series of buildings for its proposed local artificial gas plant, on which preliminary construction has been commenced. The works will consist of a generator building, $35,000; boiler and producer gas house, $45,000; gas holder, $30,000; byproducts plant, $33,500; domestic screening station, $24,500; and truck and scale house, $550, all exclusive of equipment. The machinery installation will bring the cost to more than $1,500,000, as now estimated.

Louisiana

SHREVEPORT—The Southern Oil & Refining Co., now operating two oil refineries with gross capacity of about 2,500 bbl. daily, is arranging plans for two additional refining plants for large increase in output, estimated to cost in excess of $400,000. The company is also considering the installation of cracking units for gasoline production.

Maryland

BALTIMORE—The Baltimore Copper Smelting & Rolling Co., Canton, Baltimore, a subsidiary of the American Smelting & Refining Co., 120 Broadway, New York, is pushing construction on its new 1-story addition, recently authorized, to be used primarily as a rod and wire mill, and plans for the machinery installation at an early date. The estimated cost is reported in excess of $350,000.

Massachusetts

CAMBRIDGE—Coolidge & Shattuck, Ames Bldg., Boston, architects, have preliminary sketches nearing completion for the proposed new chemistry building at Harvard University, to be submitted to the board of trustees for approval at an early date, when detailed drawings will be prepared. The structure will be located at Frisbie Pl., Oxford and Divinity Sts.

Michigan

DETROIT—The Peerless Portland Cement Co., First National Bank Bldg., has completed plans for the erection of a 2-story power house on West Jefferson St., estimated to cost $35,000, to be used for works operation in this section, and will proceed with the building at once.

Minnesota

EAST GRAND FORKS — The Minnesota Sugar Co., 416 Oak Grove St., Minneapolis, Minn., has preliminary plans under way for the erection of its proposed beet sugar-refining plant on local site, to consist of a main mill with auxiliary structures, including power house and machine shop, estimated to cost in excess of $500,000, with equipment. It is purposed to proceed with the project at an early date. H. A. Douglass is president.

Missouri

ST. JOSEPH — The Western Tablet Co., Mitchell and 11th Sts., is completing plans and will soon take bids for the erection of an addition to its paper products manufacturing plant, to be 1-story, 140x175 ft., with wing extension, 40x100 ft., estimated to cost $30,000.

KANSAS CITY—The Red Star Yeast Products Co., 79 Buffalo St., Milwaukee, Wis., has awarded a general contract to John Gosling, Railway Exchange Bldg., Kansas City, for the erection of its proposed local branch plant, to be 1- and 2-story, 50x120 ft., estimated to cost $40,000. Foundations will be laid at once. E. R. Leibert, 432 Broadway, Milwaukee, is architect.

New Jersey

NEWARK—The Republic Varnish Co., 201 Thomas St., has acquired property on Dawson St., from Thomas to Parkhurst St., in the vicinity of its works, consisting of several factory buildings, and will take possession immediately. The structures will be remodeled and improved, and equipped for additions in the present works.

NEWARK—E. I. du Pont de Nemours & Co., 256 Vanderpool St., have filed plans for the construction of a 1-story power house at their local lithopone and dry color plant, estimated to cost $22,000, for which foundations will be laid at once.

New York

BUFFALO—M. H. Birge & Sons Co., 390 Niagara St., manufacturer of wall paper, will begin the erection of a new 1-story addition to its plant, estimated to cost $20,000, for which a building permit has just been issued.

TONAWANDA—The Creo-Pipt Co., manufacturer of creosoted shingles, etc., has acquired property at Vancouver, B. C., and plans for the construction of a new Canadian branch mill, consisting of a number of buildings, with power house, reported to cost in excess of $125,000, with creosoting equipment and other machinery. The company is now operating factory branches at St. Paul, Minn., and Kansas City, Mo. H. B. Kendall is president.

HUDSON—The Federal Paper Board Co., Bogota, N. J., is said to be perfecting plans for the early rebuilding of the portion of its mill at Goulds Station, near Hudson, recently destroyed by fire. It is purposed to install additional equipment. Karl A. Lefren, 171 Madison Ave., New York, is consulting engineer for the company.

North Dakota

MINOT—The Dakota Liginite Products Co. is arranging plans for expansion and betterments in its plants, to include the installation of at least four additional carbonizing ovens and accessory apparatus at the local works, and a quantity of new briquetting machinery, to replace present worn-out equipment. It is also purposed to purchase a quantity of carbonizing and briquetting machinery for installation at contemplated branch plants.

Ohio

DAYTON—The Premier Rubber Mfg. Co., Michigan and Edmund Sts., manufacturer of molded and mechanical rubber products, has taken title to property in the vicinity of its present plant, and has tentative plans under consideration for a new mill, to be 3- or 4-story, 65x125 ft., equipped for extensive increase in output. An appropriation of about $225,000, will be made to carry out the erection. An architect has not as yet been selected, it is stated, to prepare plans.

CINCINNATI—The Buckeye Products Co., 919 West 5th St., manufacturer of foundry facings and kindred equipment, has awarded a general contract to the D. Meinken Co., Cincinnati, for the erection of a new plant on Carthage Ave., near 71st St., to be 2-story, 63x310 ft., estimated to cost about $75,000. A portion of the structure will be used for office service. Redigs, Panzer & Martin, Southern Ohio Bank Bldg., Cincinnati, are architects.

Oklahoma

ADA—The Oklahoma Pipe Line Co., an interest of the Standard Oil Co. of New Jersey, 26 Broadway, New York, plans for the installation of pumping machinery, engines and accessory equipment, to cost in excess of $200,000, for use in connection with a new pipe line to the Cromwell Pool, on which work is being commenced. Arrangements will be made at the company's refinery at Baton Rouge, La., for increased crude oil facilities. The pipe line will be developed to a capacity of 20,000 tons per day.

Pennsylvania

GLENDALE—The O. Hommel Co., 209-13 4th Ave., Pittsburgh, manufacturer of enameling oxides, china and glass colors, chemicals, etc., has awarded a general contract to A. B. Morris, 519 West Main St., Carnegie, Pa., for the erection of a new plant on Hope Way, Glendale, to be 1-story, 30x150 ft., estimated to cost approximately $42,000, with equipment. Work will be placed under way at an early date.

PHILADELPHIA — The Gorgas-Pierie Co., foot of Bigler St., manufacturer of coconut oil products, etc., is reported to have tentative plans under consideration for the rebuilding of the portion of its plant, destroyed by fire, Aug. 8, with loss reported at close to $750,000, including equipment. W. S. Pierie is head.

AMBLER—The J. E. Marsden Glass Works, Inc., plans for extensions and betterments in its plant for increased capacity. A new 10x65-ft. lehr will be installed in connection with other apparatus. Contract for the lehr construction has been let to the Simplex Engineering Co., Washington, Pa.

PHILADELPHIA — The Pennsylvania Salt Mfg. Co., Widener Bldg., has construction in progress on a new plant, 100x200 ft., at the Greenwich pier, to be used for acid production and other service.

Rhode Island

HILLSGROVE—The Rhode Island Malleable Iron Works, Hillsgrove, has awarded a general contract to the C. I. Bigney Construction Co., Providence, R. I., for the erection of a 1-story foundry addition, 122x140 ft., to be used for the production of malleable iron and other castings, estimated to cost $56,000.

Tennessee

NASHVILLE — The Hermitage Portland Cement Co., 3rd Ave., has preliminary plans under way for enlargements in its mill, including the installation of additional equipment, estimated to cost close to $300,000, with buildings. It is purposed to install a new kiln. Contracts will be placed for the majority of the apparatus early in the coming year. R. T. Miller is general manager.

Texas

RANGER — The Phillips Petroleum Co., Bartlesville, Okla., is reported to be planning for the installation of a carbon black manufacturing plant in this vicinity, using the residue gas from its gasoline plants for operating service.

Washington

BELLINGHAM — The Peoples Fuel Co., Cornwall and Chestnut Sts., has plans for the construction of a new fuel-carbonizing plant on the Guide Meridian Rd., estimated to cost $75,000, with equipment. Work will be commenced soon. F. E. Hobson is general manager.

SEATTLE—The Kusak Cut Glass Co., 2803 Jackson St., has awarded a general contract to Wesley Langer, 4918 Greenwood Ave., for the erection of a new 2-story plant in the Rainier Valley section, and will begin work at once.

New Companies

WESTERN CARBON PAPER MFG. CO., Los Angeles, Calif.; carbon and other papers; $100,000. Incorporators: C. K. Bland, E. Rutledge and A. Barstow, all of Alhambra, Calif.

FEDERAL RETINNING CO., Room 1520, 127 North Dearborn St., Chicago, Ill.; retinning and metal processing; 75 shares of stock, no par value. Incorporators: E. Goodman, Alexander Haritonol and Montague Hicks.

CUMBERLAND FERTILIZER AND LIME CO., Bridgeton, N. J.; commercial fertilizers, lime products, etc.; $150,000. Incorporators: William M. Wheatley, Harry F. Porch and Roland R. Willoughby, 160 Atlantic Ave., Bridgeton. The last noted represents the company.

SUPERIOR TANNING CORP., Cambridge, Mass.; operate a leather tannery; $100,000. Harrison Douglas is president; and Rishton T. Bailey, 122 Orchard St., Somerville, Mass., treasurer and representative.

ZABETOL CHEMICAL CORP., New York; chemicals and chemical byproducts; Incorporators: N. Matis, B. Fleissig and S. Miller. Representatives: Cohen, Rosenthal & Altman, 152 West 42nd St., New York.

FRANKLIN FOUNDRY CORP., 908 North 1st St. Louis, Mo.; iron, steel and other metal castings; $15,000. Incorporators: Herman Weibel, Richard O. Rumor and A. L. Fauck.

UNION LEAD CO., Lake City, Colo.; lead and affiliated metal products, operate commercial reduction plants, etc.; $20,000. Incorporators: W. F. Green, S. W. Williams and R. E. Thornton. Representative: W. E. Menranhall, Lake City.

REDD CHEMICAL & NITRATE CO., Inglenook, Birmingham, Ala.; chemicals and affiliated products; $400,000. Incorporators: William R. Redd and W. H. Kettig, both of Inglenook, Birmingham.

QUALITY MOLDED PRODUCTS, INC., Jersey City, N. J.; plastic materials, molded products, etc.; $100,000. Incorporators: Alexander S. Morton and Frank E. Williamson, 1 Exchange Pl., Jersey City.

NEUHAUS-KOUCH CHEMICAL CORP., Buffalo, N. Y.; chemicals and chemical byproducts; $10,000. Incorporators: R. Neuhaus, C. M. Peabody and R. Kouch. Representatives: Shire & Jellinek, Prudential Bldg., Buffalo.

QUEENS BRICK & HOLLOW TILE CO., New York, care of the Colonial Charter Co., Ford Bldg., Wilmington, Del., representative; hollow building tile, refractory materials, etc.; $500,000. Incorporators: N. and A. Brooks, and P. D. Benson, all of New York.

CALUMET OIL CO., 7944-54 South Chicago, Ave., Chicago, Ill.; refined oil products; 500 shares of stock, no par value. Incorporators: William H. Nolan, Joseph M. Larimer and William E. Dever.

CITY PLATING & POLISHING CO., St. Louis, Mo.; operate a metal-plating works; $10,000. Incorporators: Edward A. Rottman, Albert Barth and Clyde D. Shipley, 4241 Penrose St., St. Louis. The last noted is representative.

BOSTON VERMICIDE CO., Medford, Mass.; chemical specialties; $10,000. Percy L. Jones is president, and H. Leighton Jones, 104 Magoun Ave., Medford, treasurer and representative.

KNOX PROCESS CORP., Texas City, Tex.; operate gasoline-refining plants under special electrical process; chartered under Delaware laws; $3,000,000. Work is now under way on the first unit of a proposed three-unit plant. Harmon F. Fisher is local representative.

B. & W. RUBBER CO., New York; rubber products; $35,000. Incorporators: J. Wielar and A. Brent. Representative: Abraham Wielar, 261 Broadway, New York.

HOPE PETROLEUM CORP., Tulsa, Okla.; refined petroleum products; $10,000. Incorporators: C. L. Waterbury, W. A. Greenstreet and George B. Schwabe, 1421 North Denver St., Tulsa. The last noted is representative.

CONCRETE PRODUCTS CORP. OF CALIFORNIA, INC., Monrovia, Calif.; concrete and cement products; $50,000. Incorporators: J. H. Bartle, G. B. Kalb and C. H. Price, all of Monrovia.

COLL-IODINE LABORATORIES, INC., New York; chemicals and affiliated products; 200 shares of stock, no par value. Incorporators: W. L. Bryant, G. Petts and A. Maguire. Representative: Williamson & Bayles, 115 Broadway, New York.

SPINK LACQUER FINISHING CORP., New York, care of the United States Corporation Co., 65 Cedar St., New York, representative; lacquers and kindred products; $325,000; chartered under Delaware laws.

DEHCO PITTSBURGH ENAMELING CO., Pittsburgh, Pa.; operate a general metal-enameling plant; $15,000. Myrle A. Bush, 5865 Alderson St., is treasurer and representative.

GRAFF-KITTANNING CLAY PRODUCTS CO., Worthington, Pa.; tile and other burned clay and ceramic products; $250,000. Peter Graff, 3d, Worthington, is treasurer and representative.

WOODBINE CONCRETE PRODUCTS CO., Colgate P. O., Baltimore County, Md.; concrete and cement blocks and molded ornamental specialties; $50,000. Incorporators: John M. Lowrey, Fred L. Pfeffer and Stanley Leroy Richardson.

GLOBE CHEMICAL CO., New York; chemicals and chemical byproducts; $25,000 and 1,000 shares of stock, no par value. Incorporators: F. W. Butehorn, and F. C. Taylor. Representative: F. J. Knorr, Albany, N. Y., attorney.

MERRITT CO., care of Harry K. Hoch, Ford Bldg., Wilmington, Del., representative; concrete and cement products, and ingredients; $25,000,000.

HESPERIS CHEMICAL CO., New York; chemical specialties; $20,000. Incorporators: J. Bentiboglio and P. Quinto. Representative: C. J. Giudici, 277 Broadway, New York.

Industrial Notes

SCHERING & GLATZ, INC., 90 Orange St., Bloomfield, N. J., and 150 Maiden Lane, New York, N. Y., manufacturer of medicinal chemicals and pharmaceuticals, is about to move into its new plant located at Orange and Peloubet Sts., Bloomfield, N. J. The plant when finished will represent a value of over $400,000. Himmelsbach & Schlich, of New York, are the architects and engineers.

THE CANADIAN INDUSTRIAL ALCOHOL CO., LTD., Montreal, Que., announces that George G. Kaestner, who has been in charge of the development department and the marketing of "Maple Leaf" brand denatured alcohol for anti-freeze, dried grains, feed molasses and motor fuels, has been appointed sales manager in charge of all the company's products.